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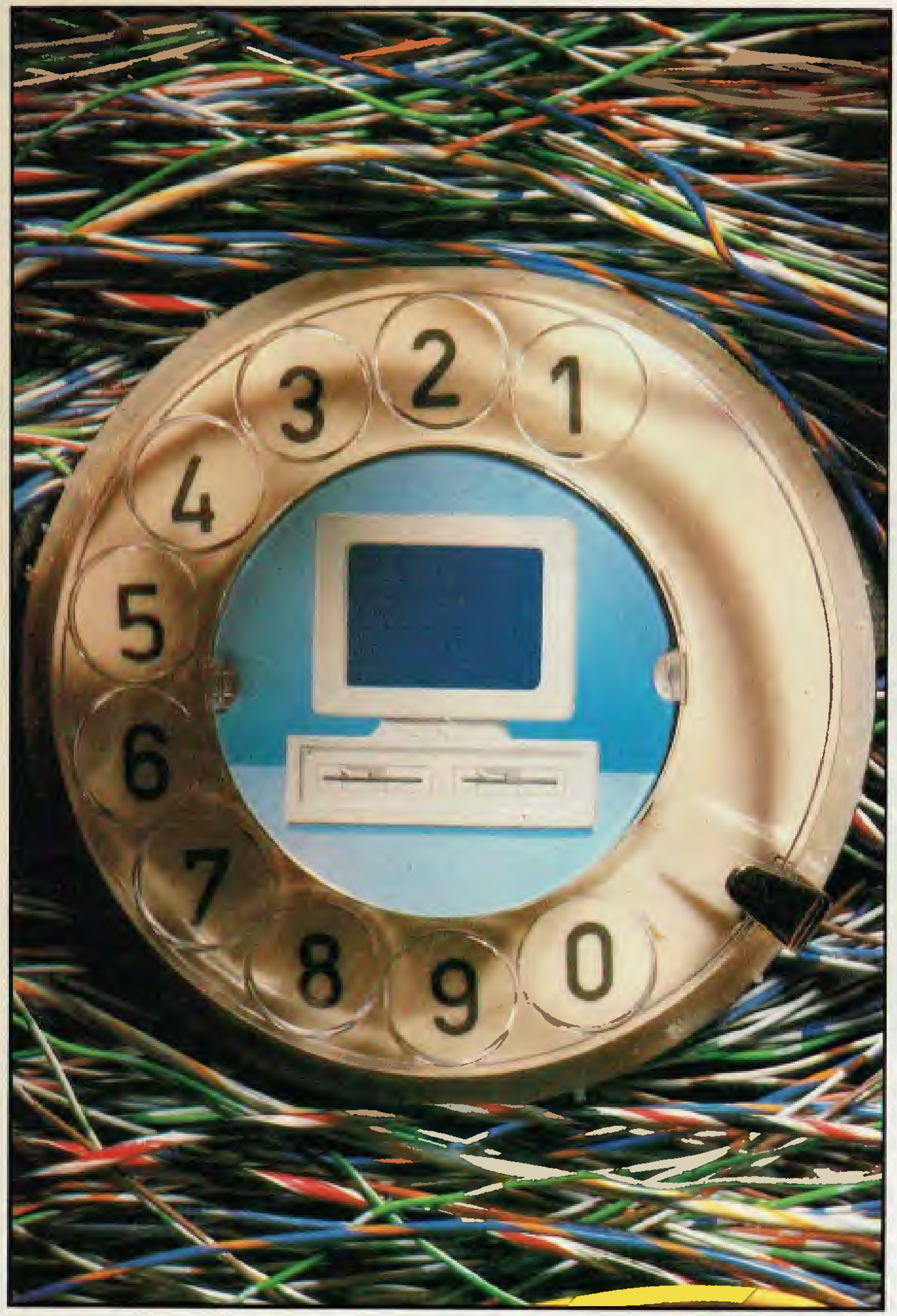

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# Sharing Apples

***Coinciding with the Mac II and Mac SE release, Apple has also announced the arrival of its file server, AppleShare. Stuart Kennedy hooks up and has s test run.***

Since Apple launched the Macintosh three years ago, it has managed to convince around one million desktop denizens worldwide to go out and buy the only personal computer with a good automatic transmission.

But behind every silver lining floats a cloud. As orchards of Macs start to sprout in corporations and delighted yuppies get over their first bout of Mac fever, questions start to get asked about 'the first computer for the rest of us' — like where is the rest of it?

Where is the open architecture Macintosh? Or the hard disk tape backup or the PC compatible disk drive or that long promised file server which will enable Justin to send meaningful memos to Janelle's Mac, (and hopefully Janelle), over in the marketing department.

Well, as of the Appleworld extravaganza in Century City, Los Angeles, all those long lusted after goodies have shrugged off the chameleon coat of rumour and burst forth into the light of day — including Justin's file server, known as AppleShare.

## *Born to serve*

For those singular souls wondering what a file server is, we will take a paragraph or two off for some explanation.

A file server manages the flow of file traffic on a computer network between users and a central storage device, typically a hard disk or disks. It allows any computer on the network access to the entire disk (or volume) depending on the user's access privileges.

A file server differs from a disk server, in that a disk server breaks the surface of a hard disk down into discrete partitions which appear to the user as a virtual disk drive. Only one user can own *write* access to a particular volume at any one time. MacServe is an example of a disk server, while TOPS and AppleShare are file servers.

A disk server doles out pieces of raw hard disk to the hungry throng with limited file sharing between them, while

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a file server allows its users to look at and modify the entire disk surface, all together — again depending on access privileges, which will be detailed later on.

Both methods beat the hell out of running around the building with a floppy disk in your hand when a file needs to be shifted from Mac A to Mac B.

The Mac to Mac freeway — or should I say laneway — over which AppleShare serves is the varicose, 0.23 Megabit per second AppleTalk shielded twisted pair cabling. At least, at around $100 a connection, it is relatively cheap compared to something flash, fast and pricey like Ethernet wire.

AppleShare consists of four floppy disks, two of them being backups, and two manuals. The AppleShare Administrator's Guide

is for the network boss man and the User's Guide is for the edification of the slaves toiling at their AppleShare workstations. Both manuals are up to Apple's usual high standard of documentation with clear English and plenty of well thought out diagrams but I can imagine the single copy of the User's guide becoming very well thumbed on a large network.

The AppleShare Server Installer disk is used to set up the Mac and hard disk which will act as the server and the AppleShare Workstation Installer provides the means for server users to clock on at the beginning of the workstation day. There is no tedious copy protection on the software, but Apple states in its licence that the server software can only be installed on one Macintosh — additional copies of AppleShare must be bought for each server.

One server will support up to 25 users.

While AppleShare is yours for $1395 there is a slight monetary catch beside the cost of the software, AppleTalk cabling and at least one SCSI hard disk to get all those lonely Macs chatting files over the back fence.

AppleShare requires at least one Macintosh Plus, SE or II to spend 100 per cent of its time answering the needs of the troops in network land.

That's right, unlike other file server software like TOPS and Hypernet which do their thing in the background of the server Macintosh, AppleShare requires the complete attention of the server Mac. The machine can do nothing in the way of everyday applications other than display its status screen while it is running AppleShare.

The status screen displays a log of current users and volumes as well as the time, date and an 'activity meter' which shows how busy the server is.

So Apple's file server really costs $1395 *plus* the slug of an additional Mac Plus or better. This starts to look pricey for a small network of around five users, with the bill for a dedicated Mac Plus, AppleShare and AppleTalk coming in at over $5000, not including a hard disk. That is a connection cost per user of more than $1000, which is not cheap.

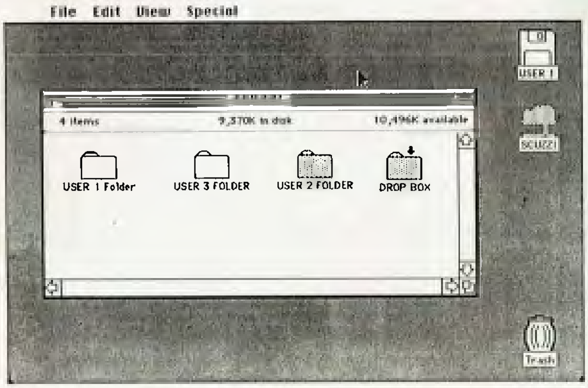

*Fig 1: On AppleShare, icons indicate the kind of access privileges allowed. Each folder has a tab to indicate ownership. A black tab means you own the folder, a white tab means it belongs to someone else on the network. If the folder is grey, it means you don't have ac-.cess privileges. A folder with an arrow at the top is a 'drop box'*

## *Getting it up*

The first step in being able to blast electronic memos at each and every networked underling requires the fundamental management skill of delegation.

AppleShare demands someone be appointed as a network administrator who will be able to initialise the server, register users, assign groups, reassign forgotten passwords, keep out the unwanted and comfort those landed with a system bomb right in the middle of a 200k spreadsheet analysis.

Prototype techies with ill fitting clothes, bad teeth, glasses and a penchant for staying back late just to try a freebie disk full of dubious desk accessories make good network administrators. Every office has one.

> *'The first step in being able to blast electronic memos at each and every networked underling requires the fundamental management skill of delegation.'*

Next step is to wire together all the Macs and other AppleTalk devices like LaserWriters and Imagewriters with the easy to install AppleTalk cabling and connect the SCSI drive/s to the server Mac. According to Apple, most third party SCSI drives should be compatible with the software. A bog standard, old model 512k is the minimum Macintosh which can hook into AppleShare as a workstation. The network must run through the printer port.

That done, it's time to fire up the hard drives and the server Mac for the AppleShare initialisation ritual. This involves running a program from the Server Installer floppy called AppleShare Admin which creates a special Server Folder on the start up volume of the administrator's choice. This folder contains all the system files needed by the server Macintosh and the AppleShare Server application which co-ordinates the show. The installer auotmatically makes this the start up application for the drive.

The Admin program can only be run from the server Mac and AppleShare shut down tasks such as registering users and server maintenance cannot be done on the fly.

Once the server is initialised, the network administrator can set about assigning each user a name and password and can then place the user into a group if so desired.

The group option is a method for enabling a user to give out common access privileges to specified network brethren. For instance, a project team could be placed in an AppleShare group which would allow each member of the team common access to the folder holding the results of their work

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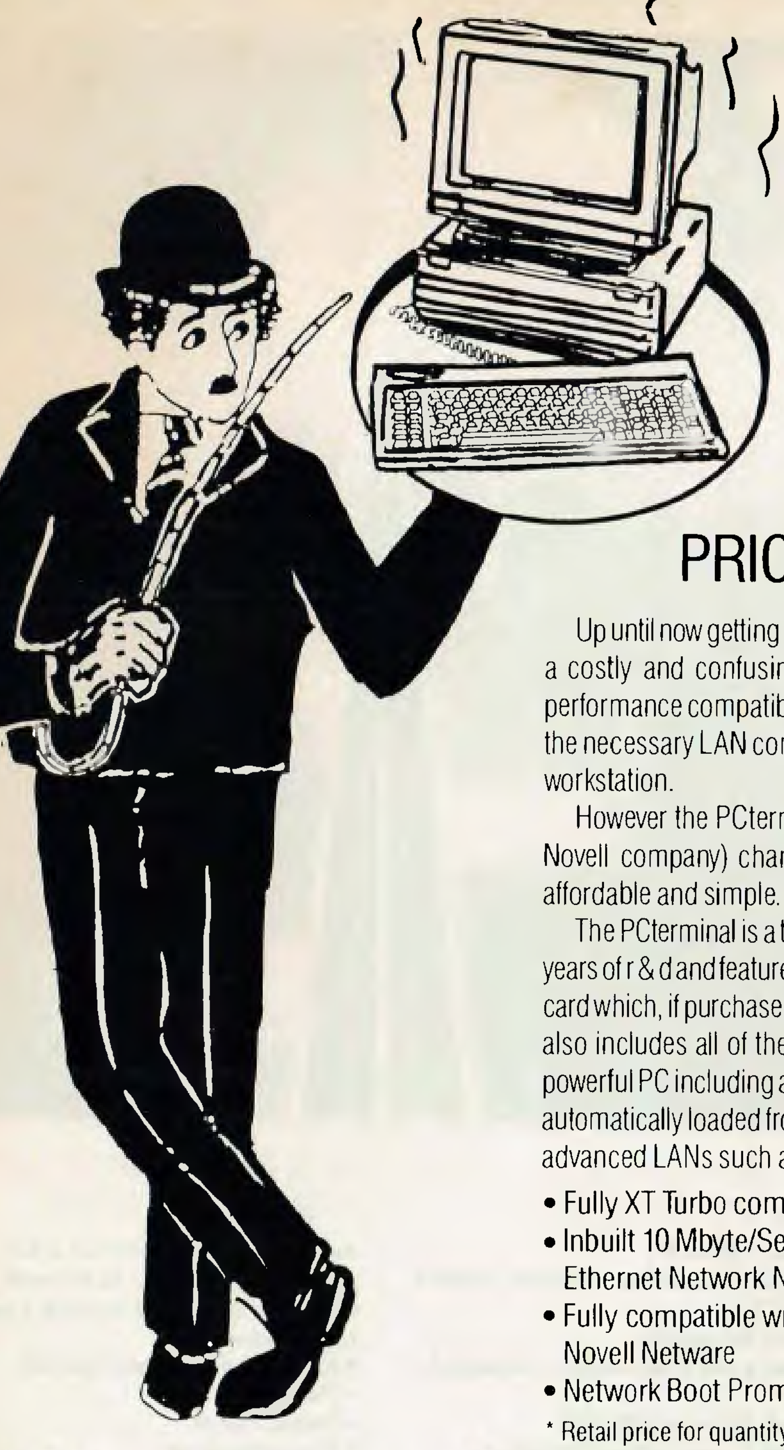

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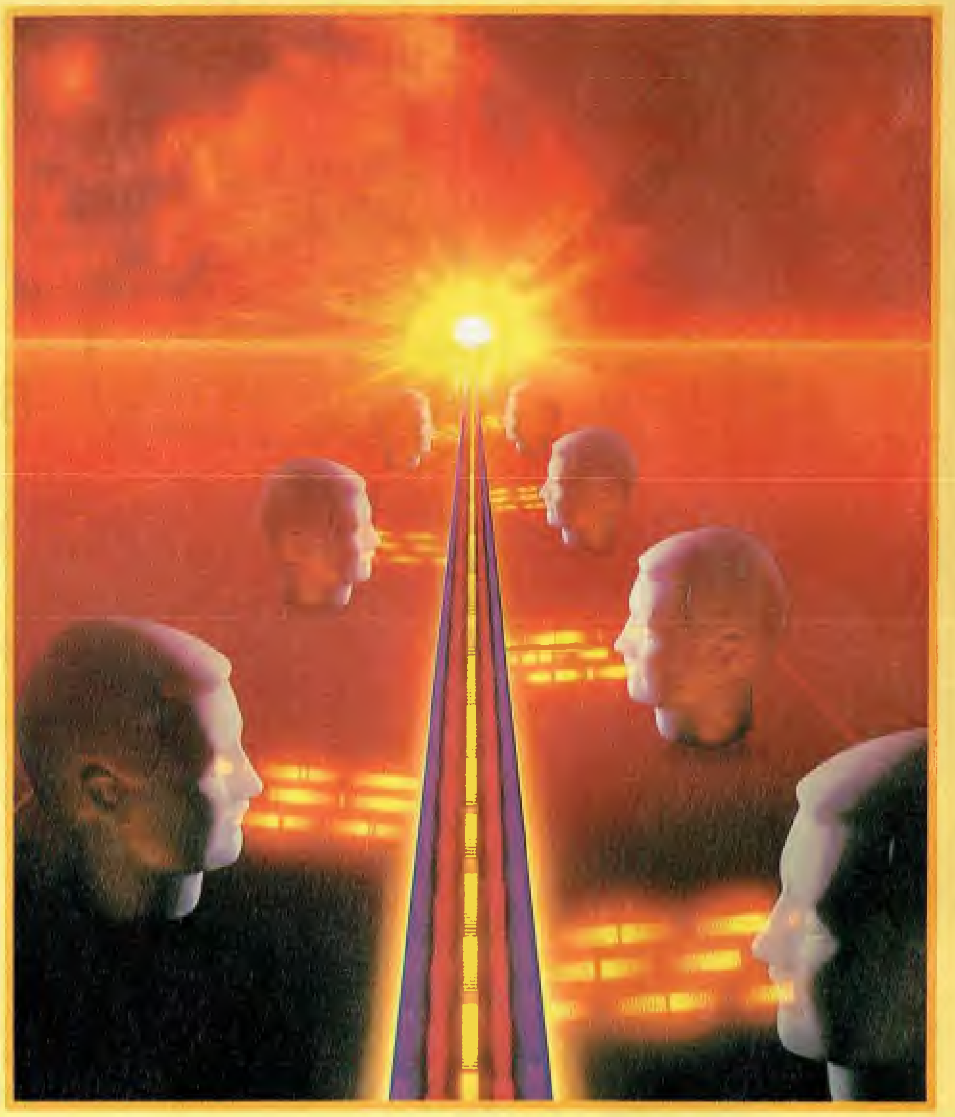

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while keeping that folder's contents from other users.

While AppleShare's security is quite sophisticated, it ends when the server is shut down. Anybody wanting a look at all the files on a server volume has only to boot the server Mac without running the server application and all will be revealed. Apple recommends keeping the server under lock and key which is not such a paranoid idea if it contains sensitive information.

The server can be used as an ordinary Mac when it is offline but the Admin prgram must be used to prepare it for network use before the machine is put back online.

AppleShare allows multiple servers on the network, but a user can only log on to one server at a time. Each server, can in turn, have multiple volumes (hard disk drives) up to the seven able to be daisychained from the server Mac's SCSI port plus two chained serial disks from the modem port. A user can simultaneously access as many volumes as wanted on a particular server and it is possible for the administrator to set access privileges on entire volumes.

A workstation start up disk must be made up for every user from the supplied Workstation Installer disks. These contain the latest in a long line of Finder and System updates, namely Finder 5.4 and System 3.3 and the AppleShare driver files. There is also a copy of the Hard Disk 20 driver which coerces old 512k Mac's into using the newer Hierarchical File System (HFS) when logged into a server volume.

The disk used to start up a workstation Mac must have the latest system software on it for AppleShare to work.

## *Sharing and caring*

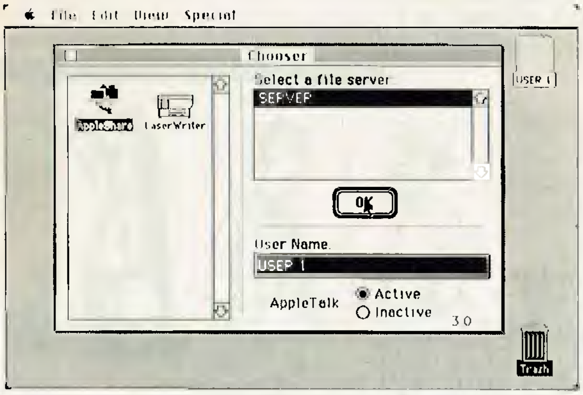
This AppleShare review network was fairly small time due to half the office Macs being away on upgrade leave. It was made up of a Macintosh SE with a 20Mbytes internal hard disk as the server, a Mac Plus and two 512k machines as workstations and a LaserWriter just for fun.

Long time Macintosh manipulators generally have a serious need — the need for speed! After two years of listening to the slow moan of an old 400k Macintosh floppy and spending lifetimes between applications and the desktop this reviewer has had plenty of dreamtime for fast SCSI hard disks punching through the data logjam.

So it is a mild disappointment to find:

- There is no way known a server volume can be made the workstation start up disk so that System and Finder files can be quickly accessed and the internal floppy drive relegated to peaceful, silent retirement. A workstation is restricted to using the start up floppy as the reservoir for all system software, printer drivers, fonts and desk accessories. I assume Apple has made this constraint on purpose as the overhead of running the networked Mac's operating systems would slow AppleShare to a crawl as well as causing rashes of system crashes with people attempting to run off common system folders. This is where the rigid partitioning of a disk server has the advantage. Of course, if you are the rich kid on the network and have a hard disk to start up from, then the fast lane is yours. In desperation, I tried using Ramstart to build a fast system RAM disk but its driver conflicted with AppleShare and I resigned myself to the floppy.
- With a transfer rate through AppleTalk of only 0.23 Megabits per second the server volume pushes data at only a marginally faster speed than one of the newer 800k Macintosh floppies, so the need for speed is again frustrated.
- An old 512k Mac equipped with a 400k floppy does not have much room for niceties like printer resources, fancy fonts and reams of desk accessories. Finders and System files grow larger with every update and the latest pair are no exception. Finder 5.4 takes up 78k and System 3.3 weighs in around 160k when stripped down to essential fonts and desk accessories. Add the mandatory AppleShare drivers and Hard Disk 20 driver and things are getting pretty squeezy.

I managed to just slip in the LaserWriter resources onto the 512k workstations with 7k to spare. One way around the lack of system installed fonts and desk accessories is to install them into your applications on the server volume using the undocumented Font/DA Mover trick of holding down the Command and Option keys when you click the Open button. You will then get a list of applications to install into rather than system files. What AppleShare does deliver is an elegant method of sending and receiving files among your network colleagues. It also offers room to move for those used to the constraints of floppy disks, assuming there are not 25 people logged onto one 20Mbytes drive.



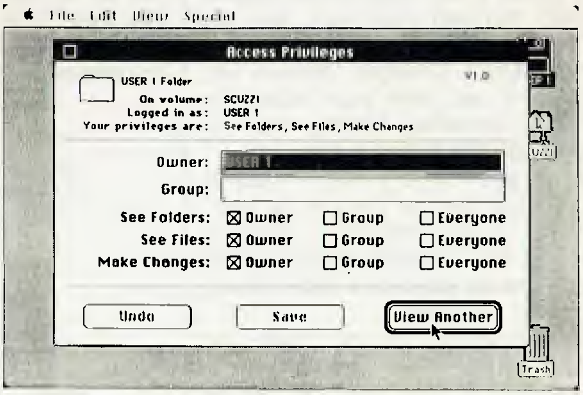
Select a file server
SERVER

User Name
USER 1

AppleTalk ● Active ○ Inactive

3.0

*Fig 2: Getting on to AppleShare using the Chooser desk accessory.*



USER 1 Folder

V1.0

On volume: SCUZZI

Logged in as: USER 1

Your privileges are: See Folders, See Files, Make Changes

Owner: USER 1

Group:

See Folders: ☒ Owner ☐ Group ☐ Everyone

See Files: ☒ Owner ☐ Group ☐ Everyone

Make Changes: ☒ Owner ☐ Group ☐ Everyone

*Fig 3: The Access Privileges desk accessory is the key to laying down the law on who can see you and who can't.*

No performance Benchmarks were carried out on AppleShare as the speed of the system would vary wildly depending on factors such as number of users and their activity on the server at a given instant; the type of Mac used as a workstation and the speed of the server's hard disk/s.

## Private lives

A workstation client logs onto a server by booting up his or her Mac and grabbing the Chooser desk accessory which is used for selecting devices on an AppleTalk network (see Fig 2.)

Clicking on the AppleShare icon brings up a choice of available file servers and clicking on a server interrogates the user for a name and password before putting up a list of available volumes. There is an option for all these choices to be saved, in which case the whole process is automatic at the next start up. Once a volume has been chosen, it appears on the Mac's desktop and AppleSharing can begin.

Getting off the server is simply a matter of trashing the AppleShare icon or shutting down the Mac.

Once on the network, it is up to the user to create folders and assign access to them through AppleShare's Access Privileges desk accessory. There are three types of access which a user can give to a folder, namely See Folders, See Files and Make Changes and three options for whom the privileges apply to — the folder owner, a group or everyone and his dog. Folder icons reflect the state of access allowed by the owner. (see Fig 3)

With See Folders set, others can travel down a folder path but cannot see the files they contain, while See Files allows one's network colleagues to check out and copy your files but not do any damage to the originals. With the Make Changes attribute set, other users can treat your folders as their own, including deleting them or planning abusive messages.

It is not possible to make restrictions on individual files but this can be overcome by simply creating a folder to hold one file. Perhaps Apple should have called the product a folder server rather than a file server.

Access privileges can be mixed and matched to the folder owners wishes. For instance, a 'drop box' can be set up by setting the Make Changes option on a folder but restricting folder and file visibility. The drop box would be useful for someone who wants to collect work from a group, but doesn't want the group members to be able to view each other's work. Plagiarism might be the sincerest form of flattery but it doesn't exactly encourage creativity.

The access attributes of a folder and other folders inside it travel across when someone else takes a copy, so that if user A copies a folder belonging to user B which has been restricted to See Folders, then user A's clone will behave in the same way as original. When an attempt is made to copy a hierarchical group of folders belonging to someone else in which some of the contents are totally restricted, the software will only duplicate those folders which have access privileges.

There is an anomaly with this scheme however, which could cause big problems on an AppleShare network. It is possible to move a folder inside another folder without copying it and all root folders are visible *and* movable at the volume level even though their access might be completely restricted. This means that User A, either through malice or accident can move user B's root folder/s into one belonging to user A. While user A might not be able to do anything to the swiped folder it will have disappeared from User B's point of view and if user A's folder has no access there is no way user B can go searching for it.

To prevent Cases of the Missing Folder, Apple should have included some method of literally nailing a folder down to the desktop.

Changes on AppleShare volumes appear dynamically to all users right around the network. It is quite a novelty at first to be sitting contemplating a Macintosh desktop and see a folder freshly created by someone else pop up on the screen as if by magic. This trick is managed by a system file on the server volume called the Desktop Manager. It does take a number of seconds for changes to ripple along the network, however.

If you elect to run application software from an AppleShare server, rather than just using it for file storage, bear in mind that most Mac software is definitely not multi-user. The Omnis 3 Plus and Helix database programs are the only exceptions I can think of.

It is not possible to place just one copy of a program like Mac Write in a public access folder and expect everybody on the network to be able to run it at once — the result will be more bombs than the Blitz. The trick is for users to keep individual copies of their applications software in private access folders and use public folders for file swapping.

## Conclusion

My reservations with AppleShare are with the low data shifting speed of the AppleTalk cabling and the high cost of having to fork out for a complete machine to be able to run it.

However, this will change as third party manufacturers get into the act and produce dedicated, high performance file servers compatible with AppleShare. There are also a number of rumours floating around that Apple is working on a much faster version of AppleTalk.

I predict the product's release will spur software developers into bringing out a wide range of multi-user applications — it is rumoured that Microsoft will release a multi-user version of Word 3 for the Mac and multi-user versions of Excel and Works may follow.

Apple's file server has been a long time coming but its sophistication and adherence to the Macintosh way of working make it the top of the line offering in Macintosh network software available today.

END

*'I've got three of them in different parts of the station.'*

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# Sounding security alarms

***Tony Dennis and Gordon Hughes investigate ways in which security measures can be improved and report on the legal status of documents sent electronically.***

Newspapers often run scare stories about the havoc that hackers can wreak with just a home micro, modem and phone. But are PC users really as vulnerable to these unwanted intrusions? The answer is, unfortunately, yes. PCs are increasingly being used in direct computer to computer file transfer, telex operations, electronic mail, teletex and fax, all of which can involve the use of standard Telecom lines. Nevertheless there are plenty of steps you can take to protect sensitive data. In this article we outline ways in which security can be improved and also examine the legal status of documents sent electronically.

A public electronic mail service, such as Telecom's Viatel, is not immune from a hack attack. Its English counterpart Telecom Gold, for example, was the victim of an infamous hack attack when it was being demonstrated on the BBC TV programme *Microlive* back in October, 1983. The hacker only had to guess a two-letter password in order to superimpose a surprise message for the presenter, John Coll. Subsequently Gold has considerably lessened a hacker's chances of breaching security by instituting a minimum six character password. (The change means that possible combinations exceed 3 million).

Despite this change, Fintech (Financial Times Business Information) discovered a breach of its own Gold mailbox in July, 1985. Someone had failed to give the 'off' command when leaving the system and a subsequent caller accidentally gained access to Fintech's mailbox. The following month Gold claimed to have plugged this hole, blaming it on a modem fault.

What the incident illustrates, however, is a definite need for training in the proper use of electronic mail; the breach would not have happened if Fintech had been signed off correctly.

You can never be 100 per cent sure that an authorised user won't be able to see the contents of a document sent via one of the public electronic mail services. A user group, for example, may make it possible for the system manager to read certain files such as 'mailsave' which contain the text of the last lengthy message to be sent. The way to beat this is to delete the 'input' or 'mailsave' files before leaving the system (logging off).

> *'The survey revealed that in one case 'chairman' had been the password for the chairman of a large company over a period of five years. . .'*

## *Alternative approach*

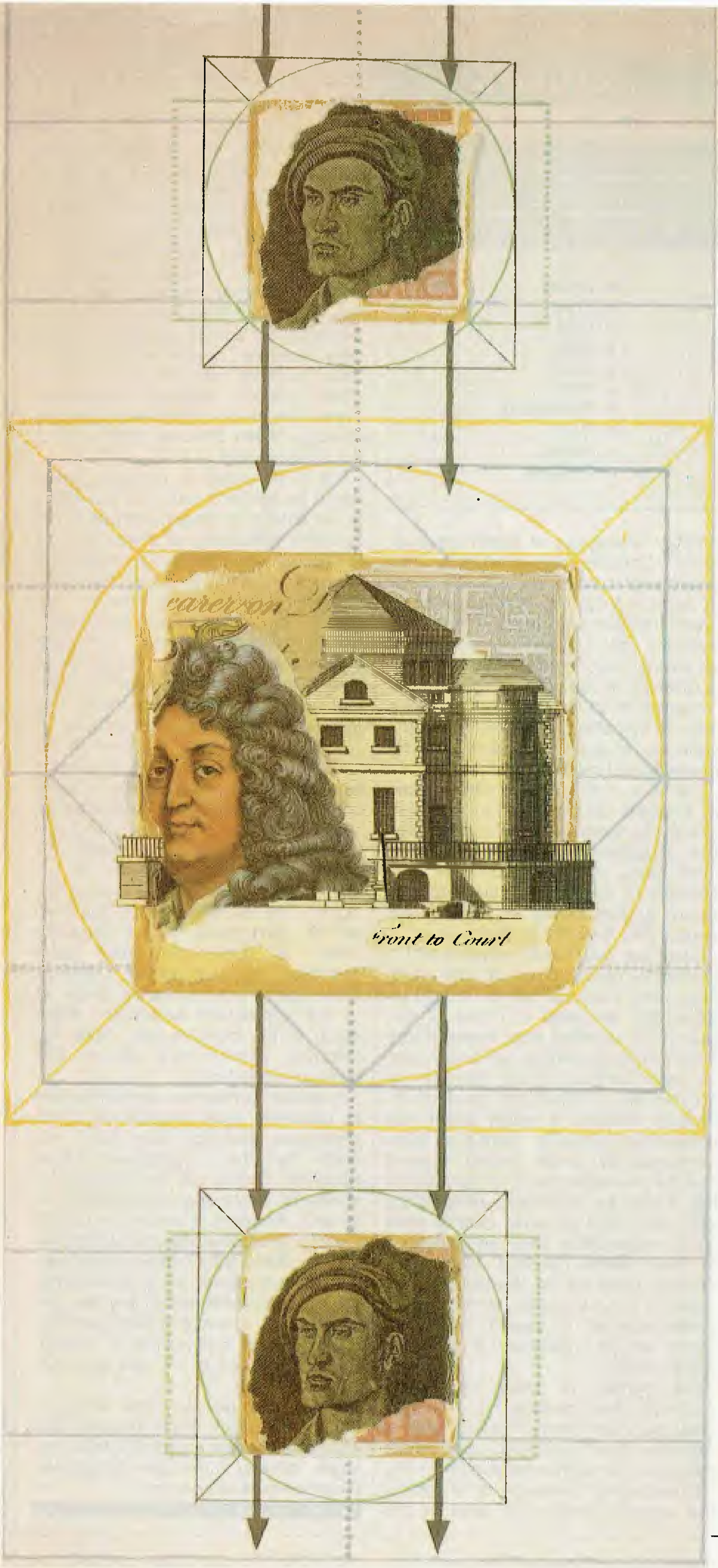
An alternative approach is for companies to operate their own private electronic mail service. This can easily be done with a single PC left in 'remote' mode and connected to an auto-answer modem. An outside caller can then dial in from an appropriate terminal plus modem. Suitable software for this is readily available. Access to the remote PC would again be controlled by password but a potential hacker would also need to discover the right phone number. As any direct line can be employed, it is much easier to protect the system by changing the number occasionally. Naturally, private systems have their drawbacks too. There was a recent scare when the Compulink user group claimed it was possible to hack into an auto-answer modem using the standard Hayes escape code sequence. The fear is that a hacker could reprogram the modem to send valuable mail to his or her own number, then phone back and restore the modem's settings to normal.

Hayes and compatible modem manufacturers vigorously deny that their modems can be breached in any such manner. Some modems contain an option whereby the modem can be controlled remotely. But this is not a default setting and can only work if you deliberately set up this facility. Even then the functions are limited and controlled by passwords.

One of the best ways to avoid the hackers is to invest in a high- speed modem but this, of course, can be expensive. Another method is to use a proprietary error checking protocol during the entire communication session. Case goes one step further and uses an encrypted protocol. If both communicating parties were to use either of these protocols it would defeat all but the most determined hacker.

An alternative security precaution is a dial-back modem. All the major modem companies have models with this capability. The principle is that the caller dials in and gives a password, then drops the line. The receiving modem checks the password against its memory, then dials back the telephone number associated with that password.

But it was recently illustrated how to defeat this precaution. Take the situation where a hacker is able to guess one of the passwords in the dial-back



modem's memory. The receiving modem accepts the password then goes off line. The hacker waits and then plays a tape recording of a dial-tone which fools the modem into dialling. After this, all the hacker needs to do is initiate his or her own modem and the dial-back system has been defeated.

However modem manufacturers have fought back and now have a product which combats this situation. It is best employed with two separate lines, the second of which accepts outgoing calls only and would thus overcome the problem as it is impossible to dial into an outgoing line.

Additionally, it can be used with a hand-held encryption device. It also accepts a password but then sends out a random number which must be fed into the device and will only allow full access when the encrypted result is fed back by the caller.

> *'It is not uncommon to see passwords taped to the side of the monitor or next to the keyboard.'*

Far too much emphasis, however, is placed on passwords. The basic problem with using them is that their human operators are too unreliable. A recent survey based on 50 audits into risks at diverse companies illustrated a general apathy and complacency towards passwords. The survey turned up signs of access by hackers on external networks on 6 per cent of sites, with a further 10 per cent showing hacking activity on internal sites by unauthorised users.

## Warrants issued

Nevertheless, often the only defence against intrusion is a password. The above survey, for example, revealed that in one case 'chairman' had been the password for the chairman of a large company over a period of five years. Despite the theoretically large number of possible permutations only around 1000 different passwords were used. In only 14 per cent of cases were passwords cancelled after a predetermined period (such as 28 days). Worse still, only 8 per cent required users to sign for re-issue in cases of forgotten passwords.

Disturbingly, the same words or simple number sequences, such as

123456789, are used repeatedly. (See the table for a list of popular passwords to avoid). 'Fred' appears to be a surprising choice until you see just how close together those characters are on the keyboard. Improvements in security can be gained by using imagination and changing passwords frequently. It is not uncommon to see passwords taped to the side of the monitor or next to the keyboard. This should be discouraged.

Passwords may assume great importance in the prosecution of 'hackers' although it is highly debatable whether their activities constitute a criminal offence at all.

In the United Kingdom, two hackers were found guilty under the *Forgery and Counterfeiting Act* 1981. The 'instruments' which they were charged with forging were effectively passwords used to obtain services from Prestel.

It is doubtful whether the decision would be followed in Australia. A recent report into computer crime by the Tasmanian Law Reform Commission criticised the use of forgery statutes in the prosecution of hackers because of the absence of an original 'document' or 'instrument' which had in fact been 'forged'. The report concluded that there was 'no existing provision' in Australian criminal law proscribing activities involving 'communicating with a computer without appropriate authority and without necessarily causing other damage to the owner or operator thereof'. Enacting appropriate anti-hacking legislation can be a headache for the authorities. Adequate safeguards have been introduced, however, in Sweden and in the United States and there are moves afoot in some Australian states.

Political, as well as legal, problems may be hindering reform in Australia. Instead of allowing each of the states to tackle the hacking problem in an *ad hoc* fashion, it would obviously be more convenient and more effective if federal legislation could be enacted. This might be achieved by the commonwealth exercising its power over national telecommunications services. However, it appears the federal government is reluctant to introduce legislation proscribing the use of telecommunications services for fraudulent or other dishonest purposes as this may be seen as an unwanted intrusion on an area (criminal law) which has traditionally been left to the states.

## TOP TEN POPULAR PASSWORDS

- Demo
- Fred
- God
- Help
- Love
- Pass
- Password
- Sex
- Sysop
- System

## *Electronic mail*

Hacking is not the only novel legal problem arising out of telecommunications. Considerable confusion has arisen over contracts which are made by telex or facsimile. Where traditional postal facilities are used, it has long been the case that an offer is regarded as having been 'made' when the letter is received by the other party, whereas 'acceptance' takes place the moment a letter to that effect is posted. Such concepts do not apply to modern telecommunications, however.

The case of *Brinkibon v Stahag Stahl* in England did manage to establish that a telex contract is made only when the acceptance is *received* by the other party. A similar decision was reached in Australia by the Supreme Court of Queensland in *Express Airways v Port Augusta Air Services.*

Case law would also suggest that a confirmed answer-back on the hardcopy telex message will be upheld as admissible evidence in cases of dispute. The situation now arises where electronic mail services are being used as telex bureaux. Since they cannot provide the answer-back for each individual mailbox, it would seem that companies receiving sensitive telex messages by Email should assume that the messages have no legal standing. It may be worthwhile establishing with the Email provider exactly what legal responsibility they are prepared to bear when handling telex. This problem could be an incentive for PC users to fit a telex card, which, used in conjunction with a normal telex line, would let you generate a standard answer-back.

The burden of proof concerning electronic mail messages is even less clear than with telex. You can send a message over electronic mail which generates an acknowledgement — the acknowledging message is posted in the sender's mailbox as soon as the communication is received. Unfortunately it is quite possible to look at the message header (thus generating an acknowledgement) without bothering to read the textual contract.

It is unfortunate that the status of fax has yet to be proved in Australian Courts. However, security measures can be taken. Encryption devices are available for secure fax communications between sender and receiver. Other facsimile machines are available which employ personal mailboxes. These machines only release the fax message when the user inserts his or her personal card.

Too much blame is obviously being laid at the hacker's door. The true hacker, as defined by Hugo Cornwall in the *Hacker's Handbook*, is someone who breaks into a system for the intellectual challenge — not to cause malicious damage. More serious threats are posed by disgruntled employees, people bent on industrial espionage and outside contractors. Many firms take few precautions against contractors who can take passwords with them which still function months later.

'Logic bombs' are a variation of the same problem. Recently an accountant in a business in Hobart planted a 'logic bomb' in the business's computerised records. He moved to Queensland and contacted his former employer by telephone, demanding money in exchange for information concerning the 'bomb'. The 'bomb' was a programmed set of instructions in the computer which, if undetected, may have destroyed the business's records. Once again, legal problems arose as to the appropriate jurisdiction within which to lay charges and, more significantly, whether any offence had been committed at all.

Australian companies seem reluctant to capitalise upon experience. Comprehensive statistics have been collated by the Computer Abuse Research Bureau at the Chisolm Institute of Technology (CIT-CARB) in Victoria. However as responses to CIT-CARB's questionnaires are confidential and voluntary, their completeness cannot be guaranteed; more significantly, it is not possible to detect any bias engendered by a desire in the reporter to minimise the appearance of foolishness on the part of his own organisation or himself.

Perhaps the ultimate irony occurs in the United States where hackers who penetrate systems sometimes find messages offering them jobs to improve the organisation's security!

END

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# Networking applications

*The recent development in multi-user software has realised market potential in networked applications. Ron Dunn reports.*

The advent of personal computer networks has left something of a vacuum in the software market. This is most evident in data file applications — how best to share data between a number of users?

Seeking an answer to this question, we decided to review the two strongest contenders in the network database market — dBase III Plus and Rbase System V.

## The products

dBase III Plus is the latest product in the successful dBase range. It is also the best to date, offering quality manuals, error free operation and strong after-market support.

The dBase line started with a CP/M product called Vulcan. This evolved into dBase II (renowned for poor operation and worse documentation) then to dBase III. After more than five years in the marketplace, the dBase range finally developed into dBase III Plus, and in doing so provided software developers and end users alike with a quality database management system.

Rbase System V is marketed in Australia by Microsoft, even though it was developed by a company called Microrim. This package was originally conceived as Rbase 1000, and developed as a derivative of a minicomputer database system. Rbase 1000 evolved to 5000, at which time Microsoft began marketing the product, then recently Rbase System V was released to the market.

Both these packages are marketed as powerful, easy to use database management systems with the added benefit of network compatibility. This review compares each from the point of view of a novice user in a network environment.

## Installation

Installing each package is an easy task, especially now that copy protection has been removed. At last backups can be made without messy un-install procedures.

Each package contains installation notes that are both clear and accurate. It is possible for a novice user to install each package with confidence in a single user environment, although the installation of dBase on a networked computer is not a task for the faint hearted.

dBase III Plus consists of five disks that must be copied individually to a hard disk directory. Rbase weighs in with a massive ten disks, occupying almost 4Mbytes of disk once installed. The Rbase installation program is comprehensive and easy to follow, although disk swapping through ten disks can become tedious.

Fig 1 shows the hardware requirements for each package. Note that while dBase will operate on disk only machines, this is really only suited to masochists.

## Documentation

Each package is documented to a high standard. Thankfully, it appears the days of shoddy packaging and documentation have been left behind.

The dBase manuals are contained in two three-ringed binders with copious divider pages to separate the sections. The manuals are clear and accurate — something that could not be said for its predecessors. The dBase documentation can be easily separated into two components — that required to use the package at end- user level, and the more comprehensive command and network management information required by application developers.

Rbase uses spiral bound manuals,

### Package requirements

| Feature | dBase | Rbase |
|---|---|---|
| Minimum RAM | 256k | 512k |
| Operating system | DOS 2.0+ | DOS 2.0+ |
| Minimum disk drives | 2 floppy | Hard disk |
| Screen type | Any | Any |
| Network supported | Novell<br>IBM | Most MS-DOS |
| Price | $1470 | $1648 |

*Fig 1: Hardware requirements*

providing three main manuals and a number of smaller leaflets and advisory papers. It would have been preferable for binders to have been used — small booklets have a nasty habit of disappearing at the wrong times.

The information contained in the Rbase manuals is first class. Included in the package is one of the nicest tutorials on applications design and development that I have ever seen. This covers the determination of requirements for a system, the design of databases, screens and reports for the application, and the development of same.

The only negative about the Rbase manuals is that a little more screen image printing would have been helpful in explaining some commands.

While on the subject of documentation, one of the major advantages dBase III Plus holds over Rbase System V is the enormous amount of third party literature available for the package. Computer bookstores are full of tutorial and advanced texts for dBase programming, some even containing examples of common applications. The value of this to a new user can not be discounted.

## Starting up

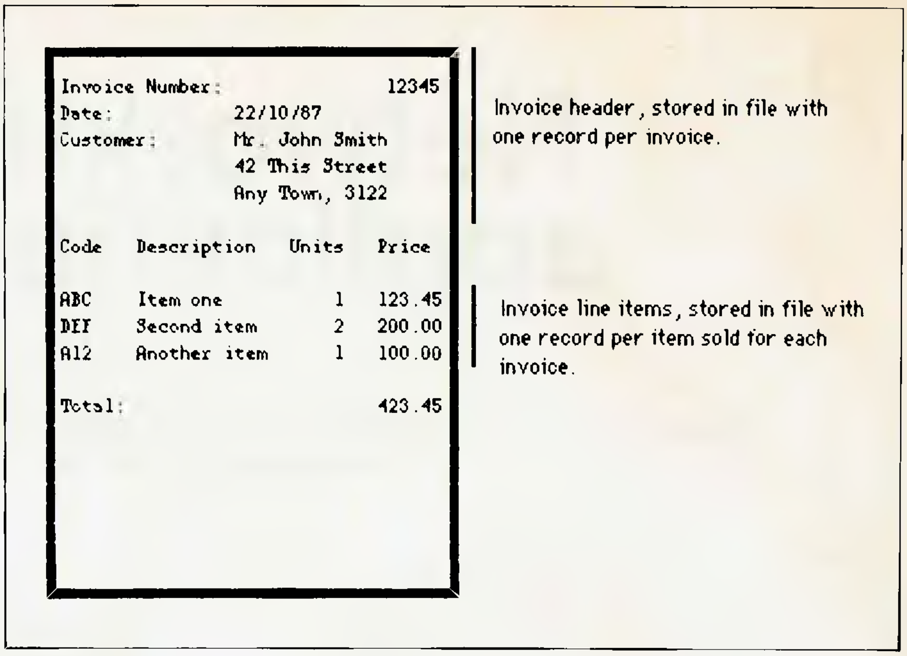
Each package requires only a single DOS command to start, although an optional parameter in dBase will allow the automatic execution of a nominated program.

As installed, each package starts with a menu driven environment smoothing the learning curve for new users. dBase calls this facility Assist, while Rbase appears to have no special name.

For the absolute novice user the dBase Assist feature is by far the most simple. It is clear and accurate, and consistent in its user interface. Using Assist it is possible to create new files, edit existing information, link files together, and print simple reports.

The Rbase environment is more of a menu controlling access to other features of the package. A series of modules called Express are used for the creation of applications.

Both packages provide facilities allowing users to customise the initial runtime environment, although Rbase appears to have the edge in this area.



```
Invoice Number:                 12345
Date:           22/10/87
Customer:       Mr. John Smith
                42 This Street
                Any Town, 3122

Code   Description     Units   Price

ABC    Item one            1   123.45
DEF    Second item         2   200.00
A12    Another item        1   100.00

Total:                         423.45
```

Invoice header, stored in file with one record per invoice.

Invoice line items, stored in file with one record per item sold for each invoice.

*Fig 2: A typical invoice form structure*

## Applications building

There are two basic types of application built by users — simple list management tasks such as mailing lists, and more complex multi-file applications for tasks such as invoicing, cataloguing and so on.

For simple applications the dBase APPSGEN application generator program wins hands down. This is a simple dBase application that allows the user to create a file and paint a screen, then generates a complete dBase menu system for file maintenance, enquiry and reporting.

Unfortunately for users, more complex operations than this require programming. And while dBase is considered a tool suitable for non-programmers, its command language is definitely oriented to those with a flair for program languages.

Rbase is completely the opposite. This package makes trivial list management applications something of a chore, yet really excels at the creation of more complex packages.

The real test of a database package is the ease with which something like an invoice form can be represented, with information coming from more than one data file. Fig 2 shows a typical invoice form structure. Using dBase III Plus the programming required for this application would take the average user at least a day. Rbase swept through this task (with a novice users) in less than half an hour.

The query language environments for the packages are easy to use, but with a different approach between each. dBase uses its own consistent syntax for data query and editing, while Rbase implements a query language not unlike IBM's SQL facility. User preference for this is largely based on aesthetics.

## Programmer features

The commands provided for programmers are similar between the two packages, as are their limitations. Rbase allows 400 fields per record against the dBase limitation of 128, although any program approaching this number should have serious attention paid to file design. Other limits are more likely to be imposed by machine rather than software capacity.

Each package provides far more inbuilt functions than any programmer is likely to want, with emphasis on data arithmetic and financial calculations. It always strikes me as amusing when database manuals appear more like those for spreadsheet packages, when most database operations consist of setting one field equal to the contents of another.

A major consideration for programmers is the ability to compile, or encrypt code. This may be done to prevent code for modification by unauthorised users, or to speed up execution. Rbase provides a feature called Codelock. As the name implies this is more to hide code from casual browsers than for any other purpose. The dBase Runtime compiler is far more efficient, offering both pseudo-compilation and execution time improvement.

A bonus with the dBase environment is the availability of true native-code compilers from third party developers.

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These allow systems developed in dBase III Plus to be distributed to other users without the need to buy additional copies of dBase for each. No similar feature is available for Rbase.

Each package provides a simple, yet thorough editor for the modification of command files. These will never win as comprehensive program text or program editors, but are well suited to their purpose.

## Network management

Network usage is another area where Rbase really shines over dBase. Developing systems for multi-user access under dBase III Plus is a job for only the most experienced programmers. Rbase automates this operation to the point where even novice users are capable of generating systems for use by more than one person.

Network management is inherent to the Rbase package, while dBase III Plus requires the installation of a product known as the Administrator.

Each packages allows more than one user to access a file at the same time, providing a means protecting against simultaneous writes to a record. The dBase tutorial on file sharing is far more comprehensive, but needs to be given the amount of extra work required.

## Performance

As a systems development tool Rbase was far faster than dBase. The reverse is true in program execution.

For large database extraction and reporting dBase performed at least 50 per cent faster than Rbase. This appeared to be due to more efficient indexing algorithms. We found it easier to enter data in Rbase applications, due to the improved validation and formatting features available from the Forms Express package. Since this is the area where most operators complain about system performance, it may be possible to consider both packages equivalent.

## Conclusion

The big question in any product comparison is which package to recommend. I am going to hedge a little and say both.

dBase III Plus wins points for its fast learning curve for simple applications, then loses for the amount of work required to generate more complex programs. It also wins for the amount of third party support available — both in literature, add-on software and programmer availability.

As a programmers' tool for software development I consider dBase III Plus the superior product due to its rich language structure and function library. The ability to interface with more traditional programming languages, and toolkits for graphics and window management, offers advantage in some applications.

Rbase is a clear winner in the end-user stakes. It is very easy to use, well documented, and allows complex applications to be built with a minimum of fuss.

As multi-user packages for network systems, Rbase System V is far in front of dBase, due again to its each of development.

Rbase loses in terms of processing speed for report and batch processing, and on the fact that there is simple no third-party support available.

I think my recommendation could best be summarised as dBase for programmers, Rbase for users.

END

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# Fitting language links

*The problems of establishing micro-to-mainframe links are well demonstrated in the task of data retrieval from diverse databases. Peter Jackson reports on a 'standard' solution to a new problem.*

In a world where standards are decided by who sells most, and where the micro and mainframe worlds still regard each other with suspicion, there is something encouraging about the PC industry's new fondness for IBM's Structured Query Language (SQL).

But the reasons are simple: SQL is the 'standard' solution to a new problem — extracting data from databases held anywhere on a network stretching around the world. As more and more users are beginning to find out, there is nothing particularly difficult about getting vast quantities of data into the various databases on networked mainframes, minicomputers and PCs these days. Getting the information back out in the way required can be more difficult, thanks to a lack of standardisation in database structure.

With SQL though, there is no need for every PC database to be file-compatible with every mainframe database — a conversion task that would cost more than the mainframes themselves. Modern databases rigorously separate the data they store from the programs used to retrieve it. This means that a variety of data extraction programs can be used on the same data files, and SQL is just a simple programming language that produces programs to query minicomputer and mainframe databases. But if a PC database includes SQL, its queries will be treated the same by any SQL-compatible database on any machine which receives them.

In other words, a PC user on a large multinational network of various sizes of machine could create a library of queries in SQL and send them out onto the network. The requested information will come back to the PC screen for analysis, but the user need never know where in the network it came from, which combination of files it was in, or whether those files were stored on mainframes, minis, micros, or all three.

With these advantages in sight, various mainframe and micro software companies have either launched products supporting SQL, or announced support for it in future products. In the mainframe world, Sterling Software and Relational Technology both have SQL products out, while in the PC market support is promised from Ansa Software with Paradox and Ashton-Tate with a new version of dBase III and Oracle, which already has Easy*SQL on the PC. Besides those, SPI's Open Access and Condor's database of the same name already use query languages either very similar to SQL or subsets of it.

## Defining criteria

Of course, behind all of this is IBM, which originally produced SQL about ten years ago as part of its first relational database for mainframes — SQL/DS — and now offers it as an access method for IMS and the new relational product, DB2.

The idea of a query language is not new, but the concept only really came into its own after IBM's database guru Ted Codd rigorously defined the criteria that make a relational database truly relational and — as a sideline — finally enforced the separation between the stored data and the software used to retrieve it. With this separation as part of the definition, querying a relational database required query programs to be written in some language or other — Cobol at most mainframe sites.

But there was no need for query languages to be the traditional third-generation mainframe languages like Cobol and Fortran. For the relatively simple task of extracting selected information from the sort of carefully structured database produced by relational theory, these languages really had too much power in the wrong places, and only allowed queries to be produced by skilled programmers.

True query languages, and the fourth generation languages (4GLs) now emerging to compete with them, are meant to be used directly by users, to tailor their own queries and retrieve their own data.

SQL is fairly typical of the breed. The set of commands is small and tailored for its particular job so that simple queries are quick and easy to produce, while complex queries can be produced by combining simpler ones. And the whole idea is to make the queries as 'English-like' as possible, while keeping the language concise.

For example, an SQL query to extract names and telephone numbers of all customers who have made an order for product number 240 might read FROM CUSTOMER SELECT NAME, PHONE WHERE NAME IN SELECT NAME FROM ORDERS WHERE PRODNO=240. What this does is select the fields 'name' and 'phone' from the file called CUSTOMER, where the names match those stored in the

'name' field of the ORDERS file where the product number field is 240.

This might look complicated, but is in fact no harder than the simple nesting of loops in conventional programming languages that every programmer learns in the second lesson. And the use of English words helps, although the syntax would not pass any grammar exams. In particular, the IN in the above example looks wrong, but turns out to be right if the groups of records retrieved are looked at as 'sets' rather than single objects. The SELECT NAME FROM ORDERS WHERE PRODNO=240 part produces a set of names extracted according to that criterion, and the first part of the query looks up the name and phone of customers whose names are contained in this set.

Using these nested techniques to retrieve different sets of information from separate files and then link them, very complex queries can be created by users.

According to Sean O'Reilly of SPI, it was this that decided SPI on an SQL subset for its Open Access database. 'We've never found a better route, although there was a debate inside the company at the time of Open Access 2 about whether we should follow the [Symantec] Q&A way of doing things, he said. 'But with Q&A the learning path to good style can be damn long, and you have to teach the system new queries, while once you have SQL under your fingers you have it all there. You can store all your regular queries, and after making a query you can simply edit it onscreen, like a text file, to enter variations in the search criteria or just narrow the search down further'.

The editing of stored queries, made possible by the separation of data and retrieval in databases, is one of the big features of SQL. But as O'Reilly says, there are alternatives. Symantec's Q&A package, produced by former artificial intelligence researchers from Stanford in the US, uses expert system techniques to make guesses about how a query will progress as it is typed in, and also allows users to build up their own vocabularies to use in queries rather than using SQL's fixed and limited one. Similarly, Microrim's R:Base 5000, now marketed by Microsoft, includes an English-style natural query language called Clout.

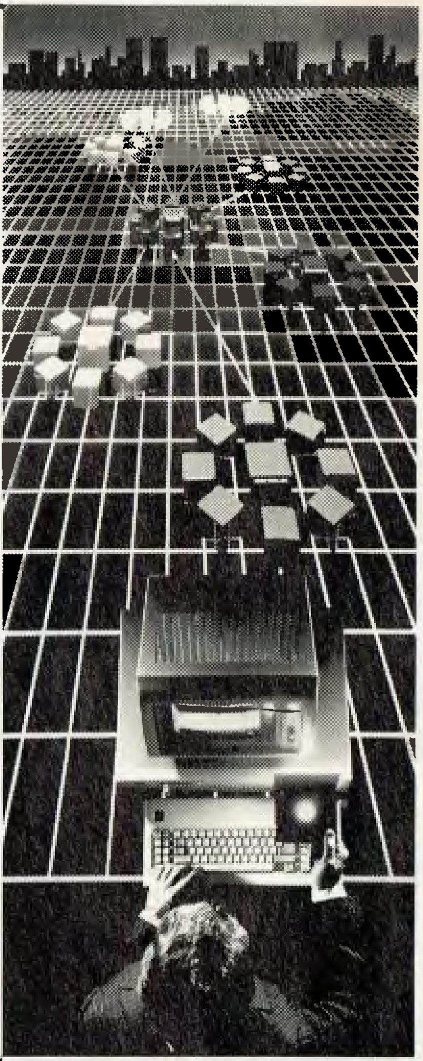
And Ansa Software's Paradox avoids query languages altogether, preferring a technique called 'query by example'. Here the query is set up by typing criteria into a replica of the file's data entry form, so that, for example, typing '>140' in the 'amount due' field on the form would find all records where the value of the field was greater than 140. This method is certainly more intuitive.

It is used particularly by the more forms-oriented databases that are becoming popular, at the expense of traditional list-based packages, as screen graphics improve.

Now though, Ansa is planning to add an SQL interface to Paradox in response to the new interest in a query-language standard across all machines. 'From a PC perspective, the advantage of SQL is being able to access data on other machines', said Ansa president Steve Dow. However, he believes that query-by-example will still be more popular with users who do not need the multi-machine access that SQL provides.

## *Choice of language*

From the mainframe and minicomputer perspective, the same considerations apply. 'We started supporting SQL in



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| SM850 | Modem 3+12 | MD, MA, ASY | 300 FDX, 1200/75 FDX (V21, V23, Bell 103) |
| SM860 | AutoModem 3+12 | AD, (PD only), MA, ASY | 300 FDX, 1200/75 FDX (V21, V23, Bell 103) |
| SM890 | SmartModem 21/23 | AD, AA, AX, AT, ASY, AR | 300 FDX, 1200/75 FDX (V21, V23, Bell 103) |
| SM891 | SmartModem 21/23SA | AD, AA, AX, AT, SY/ASY, AR | 300 FDX, 1200/75 FDX, 1200 HDX (V21, V23, Bell 103) |
| SM870 | SmartModem 1200A | AD, AA, AX, AT, ASY | 1200 FDX, (V22, Bell 212A, Bell 103) |
| SM872 | SmartModem 1200SA | AD, AA, AX, AT, SY/ASY | 1200 FDX, (V22, Bell 212A, Bell 103) |
| SM880 | SmartModem 2400A | AD, AA, AX, AT, ASY, AR | 2400 FDX, 1200 FDX (V22bis, V22, Bell 212A, Bell 103) |
| SM882 | SmartModem 2400SA | AD, AA, AX, AT, SY/ASY, AR | 2400 FDX, 1200 FDX (V22bis, V22, Bell 212A, Bell 103) |
| SM840 | SmartModem 123A | AD, AA, AX, AT, AR, ASY | 1200 FDX, 1200/75 FDX, 300 FDX (V22, V23, V21, Bell 212A, Bell 103) |
| SM842 | SmartModem 123SA | AD, AA, AX, AT, AR, SY/ASY | 1200 FDX, 1200/75 FDX, 300 FDX (V22, V23, V21, Bell 212A, Bell 103) |
| SM845 | SmartModem 1234A | AD, AA, AX, AT, AR, ASY | 2400 FDX, 1200 FDX, 1200/75 FDX, 300 FDX (V22bis, V22, V23, V21, Bell 212A, Bell 103) |
| SM847 | SmartModem 1234SA | AD, AA, AX, AT, AR, SY/ASY | 2400 FDX, 1200 FDX, 1200/75 FDX, 300 FDX (V22bis, V22, V23, V21, Bell 212A, Bell 103) |
| IN600 | PC In/Modem | FI, AD, AA, AX, AT, ASY, AR | 300 FDX, 1200/75 FDX (V21, V23, Bell 103) |
| IN610 | 1200 In/Modem | FI, AD, AA, AX, AT, ASY, AR | 1200 FDX, 300 FDX (V22, Bell 103) |
| IN615 | 2400 In/Modem | FI, AD, AA, AX, AT, ASY AR | 2400 FDX, 1200 FDX, 300 FDX (V22bis, V22, Bell 212A, Bell 103) |
| IN620 | 123 In/Modem | FI, AD, AA, AX, AT, AR, ASY | 1200 FDX, 1200/75 FDX, 300 FDX (V22, V23, V21, Bell 212A, Bell 103) |
| IN625 | 1234 In/Modem | FI, AD, AA, AX, AT, AR, ASY | 2400 FDX, 1200 FDX, 1200/75 FDX, 300 FDX (V22bis, V22, V23, V21, Bell 212A, Bell 103) |
| TR100 | TrailBlazer | 18,000 bps Packetised Ensemble Modem; AD, AA, AX, AT, AR, ASY, EC, 2 wire PSTN | High Speed, 2400 FDX, 1200 FDX, 300 FDX (Adaptive Duplex, Bell 212A, Bell 103, V22, V22bis) |
| TR200 | TrailBlazer PC | FI, as above | As above |

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MD — Manual Dial
MA — Manual Answer
PD — Pulse Dial
AD — Auto Dial
AR — Auto Ranging
AA — Auto Answer
AX — Auto Disconnect
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NE32FPC

1986, and it is released and running', said spokeswoman Debbie Muzio of Relational Technology, whose Ingres relational database was one of the first in the DEC minicomputer market. 'We offer a choice of the QUEL query language, which was specifically developed for Ingres, and then SQL to meet market trends', she said. 'The point is that different groups like ANSI in the US were looking for some standard database language, and went for SQL because of IBM. It doesn't have any particular advantages, and having been able to use both, I would say that QUEL is somewhat simpler'.

However, Muzio accepts that SQL will provide a link between PCs and bigger machines on the new networked databases running across multinational webs of hardware. 'That can be done eventually through distributed database software using gateway tools, so that SQL commands can be put through a pre-processor at each machine and then fed through foreign database products, she explains. 'Standardisation will help a lot with that, and then PCs can transparently access information in Sydney, New York and Tokyo without the users having to know how to get to them. Just run a query, and you get what you want without having to know where the files are'.

Naturally, Relational Technology has recently released a distributed network version of Ingres, and already has linking software to connect PCs into it.

Similarly, Sterling Software has been working on micro/mainframe integration for several years. Now it is putting SQL into its Lotus/Answer and dBase/Answer packages for the PC, which allow mainframe data to be downloaded directly into 1-2-3, Symphony and dBase III.

'We're doing it because we have a large number of customers using IMS or DMI on their IBM mainframes, and many customers are going to DB2', said Sterling marketing man Gordon Condrup. 'The market is essentially large IBM users of IMS and DB2 files, and IBM in the US is an agent for Sterling's mainframe software under an IBM label, so IBM may well have pushed us to SQL.

The new versions of Lotus/Answer and dBase/Answer will, like their predecessors, require a Sterling software translation package running on the mainframe. In a typical example of the oddities of software pricing, the mainframe package costs between $30,000 and $45,000 while the packages at the PC end are around $1000 each.

'The PC software creates an SQL query off-line, and then this is sent to the mainframe as usual under CICS or TSO', said Condrup. 'Under our system, the PC user has on the disk a data directory of files, and of fields within files, that are accessible to that user. This is used by the software to generate the query, which is sent automatically to the mainframe. When the information comes back, it is already dBase III or Lotus .WKS or .WRS format for PC use'.

## Distributed databases

The type of data directory described by Condrup is important for distributed databases, where files can be anywhere in the world on any machine, but SQL requires users to know a certain amount about file names and the fields they contain before the query can be constructed. But the drive to standardisation in networked databases as well as in query languages will help, since duplication of files on several machines should stop apart from security copies, and there will be one, standard, shared file list.

There is no doubt that with IBM behind it, and mainframe users switching to the relational DB2 with its SQL front-end, there is increasing pressure on PC software developers to offer SQL as an option at least.

Indeed, at a Sterling Software user group meeting in the US, IBM's advanced database projects manager, Norris van den Berg, stated that IBM is all in favour of micro-based SQL products as these will enhance the market for DB2. 'We are dependent upon the best software vendors to help', van den Berg said.

And according to US sources, at least one of the big names will follow sooner rather than later. Ashton-Tate is rumoured to have an SQL interface ready for the next version of dBase III, and may release it in the first six months of 1987.

## Setting a standard

When Ashton-Tate does make its move, the momentum behind SQL will become even greater. 'It is rapidly becoming a standard, but it is not the sort of thing to appeal to a user of Lotus 1-2-3 or Framework', said Sterling's Condrup. 'It is not terribly easy for PC users. But it is like CICS, which was a dreadful product when it first came out, but it was a standard and now so many people relate to it that everybody has to have it'.

And at SPI, Sean O'Reilly points out the importance of standards in the new world of distributed data. 'Our whole philosophy is an integrated network environment, moving upwards to the mainframe and back down again to local departmental networks or area networks', he said.

'SQL is the only consistent thing that has proved itself very quickly, and is proving itself again and again. The learning curve is so much shorter for users switching from mainframe to PC, and back up to mini if they are all using the same query language', he adds.

The doubters acknowledge IBM's power to set industry standards, and its record in eventually getting them adopted as international standards.

But for the sceptics, SQL is not a good enough language for application development and is dismissed as a tool for simple queries that cannot be developed much further, and that cannot be used by programmers to develop custom database retrieval packages for users.

On the other hand, perhaps despite IBM's original intentions, SQL will not be used as a true application development language like dBase III, or one of the increasing number of 4GLs. It will be used by individual users of distributed databases to access the information they require, and to produce files of regular queries that can be called up, edited, tailored to meet changing conditions and otherwise personalised.

At least that is the hope of the mainframe software developers who are adopting SQL as a means of integrating their PC products with the mainframe packages the users are buying.And that is also the hope of the PC software developers who are adding SQL in response to a user demand for more seamless integration of micro databases with databases on larger machines.

It may be surprising that something so simple as a rather crude but effective industry-standard programming language could do what none of the international standards committees have managed. Yet it is just another demonstration of what mainframe companies, micro companies, and their respective users can do when their interests coincide.

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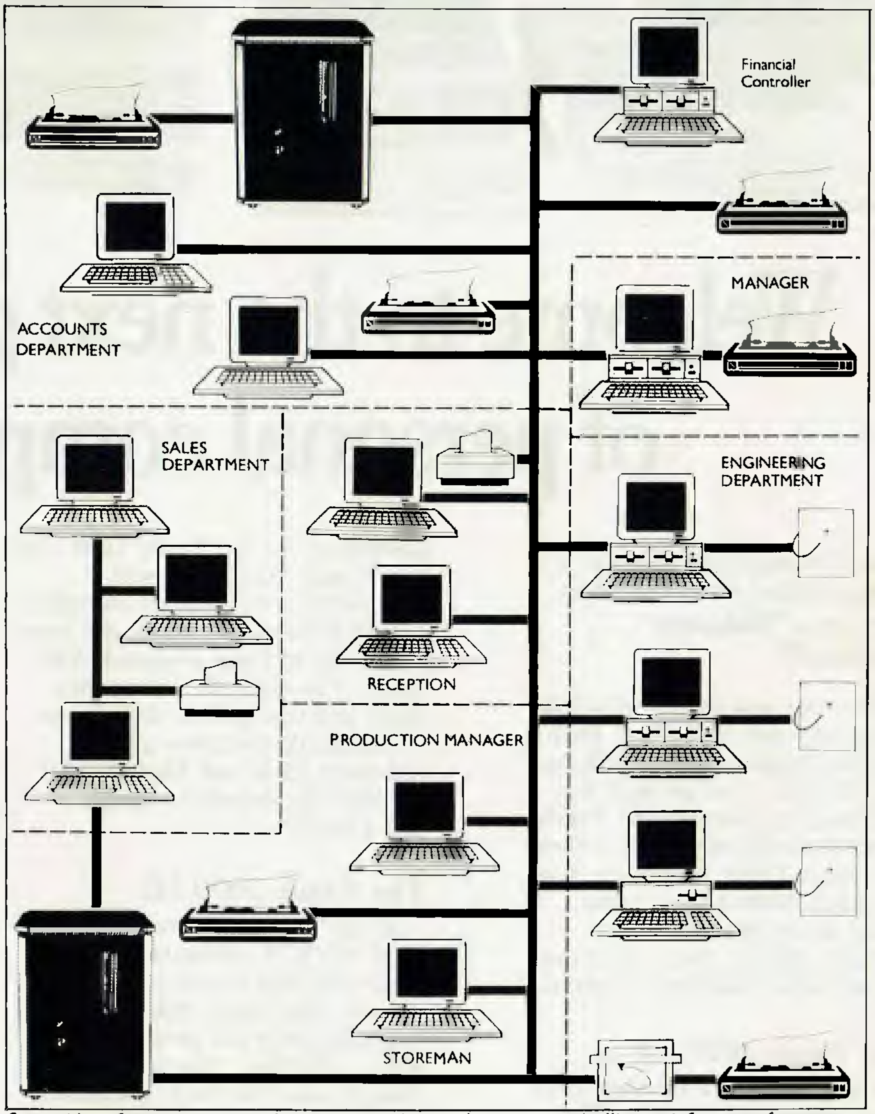

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# Thoroughly modern modems

***How to make best use of APC's buyers' guide to modems accompanying this communications special.***

Communications have come a long way since Alexander Graham Bell first lent his ear to the possibility of communicating with someone via electric impulses down a wire,.

Getting information from one place to another over long distances by using the telephone is more or less straightforward, you pick up the receiver, dial the appropriate number and you can talk to someone anywhere in the world — getting your PC to do this task for you is a little more complex.

For one thing, it is not yet possible to connect the PC directly into the telephone network because of the different transmission modes. Computers emit digital pulses while transmission over the telephone network takes the form of a frequency.

This situation will change as voice telephone networks slowly migrate to digital transmission, but meanwhile what is needed to get around this difficulty is a modem.

This survey covers the majority of modems available on the Australian market. And what a selection! The modem industry must be one of the healthiest market sectors in the Australian computer scene, as almost all US modems will not operate correctly under the Australian standards for data communications. Some US vendors wander blithely into Oz trying to secure local dealers, and some Australian buyers unwarily purchase US modems through mail order, the end result almost always being unhappiness.

This survey was compiled electronically, utilising questionnaire responses supplied by the modem vendors. As such, the information herein provides a good overview of both modem features and vendor presentation.

## *So what is a modem ?*

A modem takes the digital output signals of a computer and changes them into a frequency — this process is known as modulation. Demodulation is the reverse process, and is where the modem gets its name from. Modems can come in various shapes and forms; they can either be stand-alone, internal or cellular.

The two main types of modems are internal and external. Internal modems fit into one of the PC's expansion slots leaving valuable desk space free; exter-

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nal modems sit beside the PC and have the disadvantage of extra cabling but the flexibility of connection to non-PC computers and terminals.

An acoustic coupler is a pair of twin insulated acoustic sockets on which the telephone handset can be placed. They do, however, require more work from the user who must dial the number manually and place the handset in the coupler when the service responds.

Deciding on an internal or external type and how you are going to connect are really only the tip of the iceberg in the 'which one should I buy' problem. Compatibility with your own hardware, the speeds it can handle, what software it can talk to and Telecom approval must be taken into consideration.

The majority of modems are asynchronous, some are synchronous and some are both, so whatever you plan to communicate with the modem must be the same.

Speeds at which data can be transmitted and the different methods used have been set by the CCITT, an agency of the International Telecommunications Union. The CCITT has given each method the letter V prefix, the most important being V21, V21bis, V22 and V24.

The difference between these standards is the speed at which data is sent and received. Speeds are measured as bits per second (bps) or as signal changes per second (baud).

V21 is mostly used for bulletin boards with information being sent and received at 300 bps, but this can be rather slow as it takes up to a minute to fill one screen. V22 uses 1200 bps, V22 bis doubles the speed of V22 to 2400 and V23 transmits at 1200 bps and receives at 75 bps and is used for videotex services such as Viatel.

Although higher speed modems cost more, charges for running the system can be lower than slow speed ones because of the reduction in data transmission times, only a consideration where connect time charging is involved, such as STD calls.

Communications between PCs in Australia is more or less straightforward because of the standards set down by CCITT, but jumping across the Pacific to communicate with the US presents problems.

In the US, the American telephone system requires a form of analogue modulation called Bell, making the Australian (and UK) systems incompatible with US modems. Some modems do offer Bell standard protocols, but these may be of marginal use due to the uncertainty of international line quality.

To overcome this problem and to gain universal access to the international phone networks, communications is often mediated by a system through which the data is transferred in 'packets' over a network. In this country such a service is supplied by Telecom and is called Austpac.

However, in the US as there is no official standard for 2400bps, high speed modems are starting to adopt the CCITT standard which hopefully will end the incompatibility between CCITT and Bell.

Modems are like every other piece of electronic gadgetry, in that the more 'bells and whistles', they have the more attractive a buy they seem.

Each new modem that sees the light of day has more functions than that of its predecessor, all may be of help to the user, but some are not necessary. What the user really wants is to transfer or receive data quickly and cheaply with the least amount of effort.

One of the main features to look for in a modem concerns the flow of data. Some modems can only receive or send data at any one time. This is referred to as half duplexing; those modems which can send and receive data at the same time are termed full duplexing.

Full duplexing is attained by using four frequencies to carry the logical values of zero and one, thereby allowing both modems to 'speak' at once without garbling each other's signal.

The modem sends and receives its data in the form of 'words' in groups of between five and eight bits. The words can be signalled by a start bit at the beginning and one or more stop bits at the end.

Another function, which many modems employ, is the X-on/X-off protocol. Since there are many different rates at which data is transmitted this function allows the receiving device to signal the sender to stop transmission while the data is being processed.

As IBM is the standard for the PC, US company Hayes has emerged as the standard for modems. 'Hayes compatibility' is rarely not on the specification sheet of a modem manufacturer. A lot of the communications software for the PC has been written under the assumption that the user will have a Hayes compatible modem. Hayes compatibility has seen the advent of microprocessors built into modems, allowing greater intelligence, superior performance and removing a burden from the software developer.

## Software

An increasing number of modem manufacturers and suppliers are now bundling communications software such as Crosstalk and Datatalk with their products. The software can add many features that allow your PC to talk to other PC's minicomputers, mainframes and subscription information services.

Crosstalk, from Microstuf, includes features such as auto-dial auto-answer, and automatic speed settings which allows it to determine the correct speed for any on-line service called. It also employs a retro-capture feature

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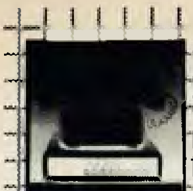

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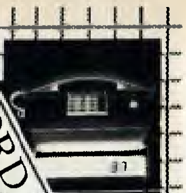

Release May

## A-24/24-x FEATURES:

- * *2400bps full duplex Sync./async.*
- * *1200bps full duplex Sync./async*
- * *1200/75bps & 75/1200 videotex standard, asynchronous.*
- * *300bps full duplex Sync./async.*
- * *Hayes compatible.*
- * *Auto bauding & common port speed.*
- * *Dial back security.*
- * *Battery backed setup memory.*
- * *LED status display & in-built speaker.*
- * *Manual and Automatic operation modes.*
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- * *Videotex software included.*
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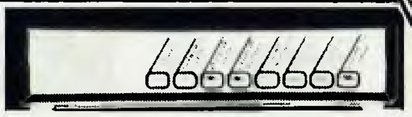

## A-12/12-x FEATURES:

- * *1200bps full duplex asynchronous.*
- * *1200/75bps videotex standard, asynchronous.*
- * *300bps full duplex asynchronous.*
- * *Hayes compatible.*
- * *Auto dial/answer/disconnect.*
- * *Tone and pulse dialling.*
- * *CCITT and BELL Standards.*
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- * *Videotex software included.*
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$699.00 inc. S.T

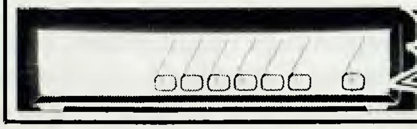
## M-12/75-X FEATURES:

- * *1200/75bps Viatel / Videotex receive standard*
- * *300bps full duplex.*
- * *Manual operation.*
- * *External low profile design.*
- * *Asynchronous full & half duplex.*
- * *Viatel software for IBM or Apple // included.*
- * *Bell standard : 103.*
- * *CCITT standards : V.21 & V.23 .*
- * *FSK operation.*
- * *RS-232 Interface (EIA Standard).*
- * *Telecom Australia Approved.*

$329.00 inc. S.T.

## A-12/75-x FEATURES :

- * *1200/75bps videotex receive standard.*
- * *300bps full duplex.*
- * *Hayes compatible.*
- * *Auto dial/answer/disconnect.*
- * *Asynchronous full & half duplex.*
- * *CCITT & BELL standards.*
- * *Videotex software included.*
- * *In-built dialling / call progress monitor.*
- * *RS-232 Interface (EIA Standard).*
- * *55 Page educational instruction manual.*
- * *Telecom Australia Approved.*



$399.00 inc. S.T.

**VICTORIA:** A.C.D. — 76 St Kilda Road. ST KILDA — 537 1722 ● A.S.P. Computers — 19 Cummins Grove. MALVERN — 500 0628 ● Choice Systems — 123 Whitehorse Road. DEEPDENE. 3103 — 817 6132 ● Compak — 156 Martin Street. GARDENVALE — 596 7222 ● Computers 2000 — 14 Young Street. FRANKSTON — 008 781 4244 ● E.M.E — 215 Park Street. SOUTH MELBOURNE — 699 3088 ● Greensborough Computers — 67 Grimshaw St. GREENSBOROUGH — 434 6166 ● KCM Computers — 380 Victoria St. RICHMOND — 429 2733 ● Logic Shop — 1131 High St. ARMADALE ● Lasernet Computing — 248 St Kild Rd. ST KILDA — 534 0489 ● MicroBuff — 499 High St. MT WAVERLEY — 277 7754 ● Amicroc — 267 6072

**SYDNEY:** A.C.D. — 69 Oxford St. BOWOR JUNCTION — 389 4922 ● Eastern Micro Electronics — Gnd Fl. 88 Foveauk St. SURREY HILL — 212 6944 ● Insight Computer Services — 14 Edward Bennett Drive. WEST PENNABT HILLS — 634 2580

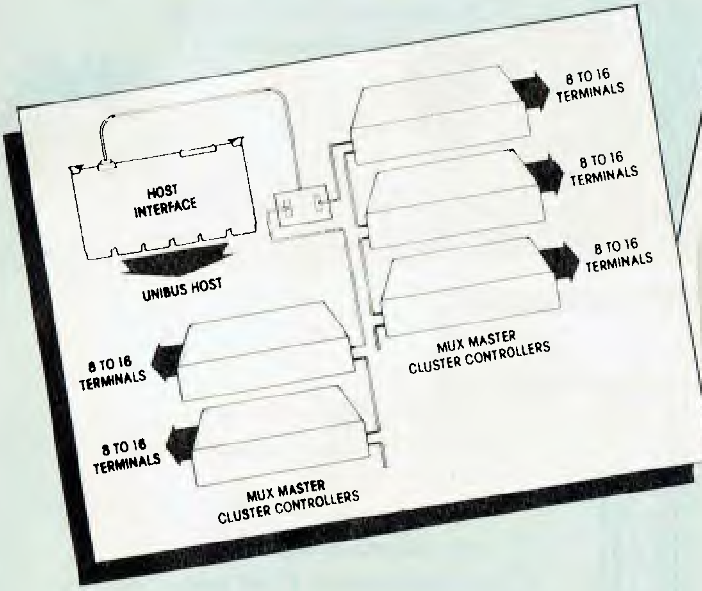
**Designed & marketed by:** INTERLINK electronics. 171 Dorcas Street, South Melbourne. Australia. 3205. Tel: 03 699-4177.

Due to continuing research and development specifications are subject to change without notice.

4-U-2-C

# *DEC VAX/VMS, MICRO VAX and *PDP11 use MUX MASTER

# The cost effective answer to local networks



A single Mux Master host board, installed with our cluster controllers, lets you make 128 Unibus or 64 Q-bus terminal connections through a composite link. You order as many 8 or 16 line cluster controllers as you need, when you need them and mount them on a wall, deck or floor stand anywhere on the link.

Then as your requirements change, you add new controllers or remove existing ones simply and without disrupting the operation in any way. Anyone can do it. Concentrated one-time wiring makes it possible for the user to complete the process in a matter of minutes.

For the complete MUX Master story phone us on **(02) 331 7300**

**ABLE COMPUTER**

**KAIRINSKY**
& ASSOCIATES PTY. LTD.

**CALL: SYDNEY: (02) 331 7300 MELBOURNE: (03) 240 8461 BRISBANE: (07) 221 8343**

*Registered trademark of Digital Equipment Corporation.

which allows you to store data that has already been scrolled off the screen.

PC-Talk is a popular public domain communications package providing many of the features found in Crosstalk. Carbon Copy, rather than being a generalised communications product, allows the user of one PC to dial up another PC and interact as though using the remote machines keyboard and screen directly — a boon for support situations.

Communications products seem to be migrating away from the generalised package style of PC-Talk and Crosstalk, moving towards push button access to specific services. Access to the services is obtained via a directory which allows the user to store telephone numbers along with a name, a code and brief information. The code allows you to auto-dial much more easily, so that entering DR will cause the software to dial the doctor automatically.

Other functions performed by the software include modem testing, auto-redialling and security help. Most products include an 'error-free' transmission facility which automatically verifies that the data arrived intact, retransmitting if necessary. This feature is essential for any serious interchange of information, as telephone line quality may vary significantly.

The auto-redialling facility allows you to access the last number dialled. But the number of times this facility can be used within a given time is restricted by Telecom to stop it being used for criminal purposes, such as jamming emergency lines.

Although Hayes has set the standard for modems, it is represented in the Australian market only by modems produced by other vendors which adhere to the Hayes standard. Since modem manufacturers keep adding new features such as 1200/75 bps speed conversion (a feature with almost no use in the US), the Hayes 'standard' has been adapted by each vendor with the result that most modems implement a different superset of Hayes compatibility.

A few modems are still available which do not employ the Hayes standard, but these are becoming few and far between.

Prices for modems can range from about $175 for simple 300 bps or 1200/75 bps models up to $600 to $1000 for 1200 bps full duplex units, most of which also provide the lower speed protocols. For high speed modems, the sky is the limit.

Before going out and buying a modem, first go through the check list:

- Internal/external compatibility
- Speed
- Extra features required.

Be very wary of purchasing modems through overseas mail order or while travelling on business — while memory is memory, modems just ain't modems.

**COMTEST** (TM) applied for

Data communications testers becoming an industry standard. Designed and priced to be **Datacomm tools** for computer engineers, system managers and salesmen. Practical teaching aids for uni professors and students.

**COMTEST V.24**
*Price: $315 incl Sales Tax*

*A complete RS232/V.24 tester:*

- Breaks and redirects all 25 lines
- Tri-state monitoring of all signals
- Open Circuit Voltage test (2 levels)
- Current Loop Test (4 levels)
- Pocket size, no batteries

**COMTEST X.21**
*Price: $495 incl Sales Tax*

*A complete X.21 (comprising X.20 & X.22) tester, fully compatible with RS422-423/V.10-11 interface and X.26-X.27 electrical standards.*

- Breaks and redirects all lines
- Tri-state monitoring of all signals
- Open Circuit Voltage test
- Impedance Test
- 2 additional line monitors
  - — fixed level
  - — 6 level with pulse trap and audible signalling
- RS232 adapter

Every tester comes with a carrying pouch and a set of jumpering cables.

Exclusive distributor:
**TESTRONIC (formerly MOTIVATION PLUS)**
**3 Montana Ave, North Rocks, NSW 2151.**
**Tel: (02) 630 7528 or 630 8170. Fax: (02) 29 2161.**
*Dealer enquiries welcome.*

**$250 REWARD FOR BUYING THE AWARD WINNING MODEM.**

Australian design award

Buy one of our DSP 2400 Digital Signal Processing V22 Bis modems before May 30, 1987, and we'll reward you with a special discount of $250 off the list price of:

**$1095 Ex Tax $1189 Inc. Tax**

It's a special offer too good to miss. Fantastic performance, Hayes commands. Digital Signal Processing for error-free transmissions. Ask about the extra options of dial back security, remote configure, installation support and extended warranty.

So good, it won an Australian Design Award - reserved only for outstanding Australian Products. Special discounts for bulk orders, but get in quick – offer expires May 30, 1987. Call:

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Modems, PC Networks, Ungermann-Bass LANs, X.25 Networks, Sub-LANs.
Data Bridge Electronic Communications: Melbourne (03) 578 0814. Sydney (02) 819 6474. Rosser Communications (02) 449 8233. Perth- Data Link (09) 322 5222

Chandler Hambleton Mier DLC 0003

| Make | Model | Telecom approved | 300 Baud | 1200/75 Baud | 1200/75 speed conversion | 1200 HDX | 1200 FDX | 2400 HDX | 2400 FDX | 4800 HDX | 4800 FDX | 9600 HDX | 9600 FDX | 'Bell' standard | Auto originate | Auto answer | Auto dial | Auto re-dial | Auto speed sense | Dial back security | Dialling directory | Internal help | Xon/Xoff support |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ABE COMPUTERS | MAXWELL 5 KIT. |  | ● | ● | ● | ● | ● | ● | ● |  |  |  |  | ● | ● | ● | ● |  |  |  |  | ● | ● |
| ABE COMPUTERS | MODEL 1 KIT |  | ● | ● |  |  |  |  |  |  |  |  |  | ● | ● |  |  |  |  |  |  |  |  |
| APPLE | APPLE 1200 | ● | ● | ● | ● |  |  |  |  |  |  |  |  | ● | ● | ● | ● |  |  |  |  |  | ● |
| AUTOMATIC ICE CO. | AP2 FOR APPLEII,IIGS |  | ● | ● | ● | ● |  |  |  |  |  |  |  | ● | ● | ● | ● | ● | ● |  | ● | ● | ● |
| BLACK BOX CATALOG | 1200A | ● |  |  |  |  | ● |  |  |  |  |  |  | ● | ● | ● | ● |  | ● |  |  | ● |  |
| BLACK BOX CATALOG | 1234SA | ● | ● | ● | ● |  | ● |  | ● |  |  |  |  | ● | ● | ● | ● |  | ● |  |  | ● |  |
| BLACK BOX CATALOG | 123SA | ● | ● | ● | ● |  | ● |  |  |  |  |  |  | ● | ● | ● | ● |  | ● |  |  | ● |  |
| BLACK BOX CATALOG | 21/23 | ● | ● | ● | ● |  |  |  |  |  |  |  |  | ● | ● | ● | ● |  | ● |  |  | ● |  |
| BLACK BOX CATALOG | 2400A | ● |  |  |  |  | ● |  | ● |  |  |  |  | ● | ● | ● | ● |  | ● |  |  | ● |  |
| BLACK BOX CATALOG | PC123 | ● | ● | ● | ● |  | ● |  |  |  |  |  |  | ● | ● | ● | ● |  | ● |  |  | ● |  |
| BLACK BOX CATALOG | PC1234 | ● | ● | ● | ● |  | ● |  | ● |  |  |  |  | ● | ● | ● | ● |  | ● |  |  | ● |  |
| BLACK BOX CATALOG | PC21/23 | ● | ● | ● | ● |  |  |  |  |  |  |  |  | ● | ● | ● | ● |  | ● |  |  | ● |  |
| CASE GROUP UK | 400/22B | ● |  |  |  |  | ● |  | ● |  |  |  |  |  | ● | ● | ● | ● | ● |  |  |  | ● |
| CASE GROUP UK | 9629 |  |  |  |  |  |  |  |  | ● |  | ● |  |  |  |  |  |  |  |  |  |  |  |
| CASE INC. USA. | RV22B | ● |  |  |  |  | ● |  | ● |  |  |  |  | ● | ● | ● |  |  | ● |  |  |  | ● |
| CEDATA | 1-2-3 | ● | ● | ● | ● | ● | ● |  |  |  |  |  |  | ● | ● | ● | ● |  | ● |  |  |  |  |
| CEDATA | 2123 | ● | ● | ● |  | ● |  |  |  |  |  |  |  | ● | ● | ● |  |  |  |  |  |  |  |
| CEDATA | 2123 AD | ● | ● | ● | ● | ● |  |  |  |  |  |  |  | ● | ● | ● | ● |  |  |  |  |  |  |
| CEDATA | 2123 B | ● | ● | ● | ● | ● |  |  |  |  |  |  |  | ● | ● | ● |  |  |  |  |  |  |  |
| CEDATA | 2301 | ● | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| PABX support | Hayes compatible | Videotex s'ware supplied | TTY s'ware supplied | Speaker | Battery | Internal/External modem | Acc. coupler or Modem | Asynch/Synch | No indicator LEDS | Mains or Int power supply | Other features | Price,including sales tax | Distributor | Telephone |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | • | Ext | M | Both | 10 | Int | CAN BE PURCHASED BUILT & TESTED. | $213 | **ABE COMPUTERS.** | 03-288-2144 |
| | | | | | • | Ext | M | Both | 10 | Int | KIT CAN BE BUILT & TESTED IF REQUIRED. | $495 | **ABE COMPUTERS.** | 03-288-2144 |
| | | | | | • | Ext | M | Both | 10 | Int | ALL MODEMS CAN BE MOUNTED IN 5" DRIVE POSITION. | $431 | **ABE COMPUTERS.** | 03-288-2144 |
| | | | | | • | Ext | M | Asynch | 10 | Int | CAN BE UPGRADED USING SAME MOTHER-BOARD TO A 5. | $200 | **ABE COMPUTERS.** | 03-288-2144 |
| | • | | | | • | Ext | M | Both | 10 | Int | COMMUNICATIONS SOFTWARE AVAILABLE. | $424 | **ABE COMPUTERS.** | 03-288-2144 |
| | | | | | • | Int | M | Asynch | 10 | Int | MOTHERBOARD ABLE TO MAKE ALL MAX MODELS. | $179 | **ABE COMPUTERS** | 03-288 2144 |
| | | | | | • | Ext | M | Asynch | 10 | Int | MAX KIT BUILT & TESTED | $285 | **ABE COMPUTERS** | 03-288-2144 |
| | | | | | • | Ext | M | Synch | 10 | Int | KIT CAN BE BUILT AND TESTED BY OURSELVES. | $357 | **ABE COMPUTERS.** | 03-288-2144 |
| | • | | | | • | Ext | M | Both | 10 | Int | CAN BE UPGRADED TO NEXT MODEL B & T $ 625.00 | $466 | **ABE COMPUTERS.** | 03-288-2144 |
| | • | | | | • | Ext | M | Both | 10 | Int | SIZE OF 5" DISK DRIVE FOR INTERNAL MOUNTING | $495 | **ABE COMPUTERS.** | 03-288-2144 |
| | • | | | | • | Ext | M | Both | 10 | Int | BUILT & TESTED COST $ 696.00 | $617 | **ABE COMPUTERS.** | 03-288-2144 |
| | | | | | • | Int | M | Asynch | 4 | Int | CAN FIT IN A 5" DISK DRIVE. | $95 | **ABE COMPUTERS** | 03-288-2144 |
| • | • | • | | • | | Ext | M | Asynch | 0 | Mains | | $730 | **APPLE AUSTRALIA** | (02)8885888 |
| • | | • | • | • | • | Int | M | Asynch | 1 | Int | ERROR CORRECTION,VIDEOTEXT & COMMS IN EPROM | $299 | **AUTOMATIC ICE CO.** | 049 633188 |
| • | • | • | • | • | | Ext | M | Asynch | 8 | Mains | COMES WITH FREE RS-232 TESTER | $685 | **DATACRAFT DIRECT MARKETING** | 03-725-1144 |
| • | • | • | • | • | | Ext | M | Both | 8 | Mains | COMES WITH FREE RS-232 TESTER | $1309 | **DATACRAFT DIRECT MARKETING** | 03-725-1144 |
| • | • | • | • | • | | Ext | M | Both | 8 | Mains | INCLUDES FREE RS 232 TESTER | $1095 | **DATACRAFT DIRECT MARKETING** | 03-725-1144 |
| • | • | • | • | • | | Ext | M | Asynch | 8 | Mains | COMES WITH FREE RS-232 TESTER | $443 | **DATACRAFT DIRECT MARKETING** | 03-725-1144 |
| • | • | • | • | • | | Ext | M | Asynch | 8 | Mains | COMES WITH FREE RS-232 TESTER | $959 | **DATACRAFT DIRECT MARKETING** | 03-725-1144 |
| • | • | • | • | • | | Int | M | Asynch | 0 | Int | COMES WITH FREE RS-232 TESTER | $884 | **DATACRAFT DIRECT MARKETING** | 03-725-1144 |

| Make | Model | Telecom approved | 300 Baud | 1200/75 Baud | 1200/75 speed conversion | 1200 HDX | 1200 FDX | 2400 HDX | 2400 FDX | 4800 HDX | 4800 FDX | 9600 HDX | 9600 FDX | 'Bell' standard | Auto originate | Auto answer | Auto dial | Auto re-dial | Auto speed sense | Dial back security | Dialling directory | Internal help | Xon/Xoff support |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BLACK BOX CATALOG | PC1234 | ● | ● | ● | ● |  | ● |  | ● |  |  |  |  | ● | ● | ● | ● |  | ● |  |  | ● |  |
| BLACK BOX CATALOG | PC21/23 | ● | ● | ● | ● |  |  |  |  |  |  |  |  | ● | ● | ● | ● |  | ● |  |  | ● |  |
| CASE GROUP UK | 400/22B | ● |  |  |  |  | ● |  | ● |  |  |  |  |  | ● | ● | ● | ● | ● |  |  |  | ● |
| CASE GROUP UK | 9629 |  |  |  |  |  |  |  |  | ● |  | ● |  |  |  |  |  |  |  |  |  |  |  |
| CASE INC. USA. | RV22B | ● |  |  |  |  | ● |  | ● |  |  |  |  | ● | ● | ● |  |  | ● |  |  |  | ● |
| CEDATA | 1-2-3 | ● | ● | ● | ● | ● | ● |  |  |  |  |  |  | ● | ● | ● | ● |  | ● |  |  |  |  |
| CEDATA | 2123 | ● | ● | ● |  | ● |  |  |  |  |  |  |  | ● | ● | ● |  |  |  |  |  |  |  |
| CEDATA | 2123 AD | ● | ● | ● | ● | ● |  |  |  |  |  |  |  | ● | ● | ● | ● |  |  |  |  |  |  |
| CEDATA | 2123 B | ● | ● | ● | ● | ● |  |  |  |  |  |  |  | ● | ● | ● |  |  |  |  |  |  |  |
| CEDATA | 2301 | ● | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CEDATA | 2301 B | ● | ● |  | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CEDATA | SA 123AD | ● | ● | ● | ● | ● | ● |  |  |  |  |  |  | ● | ● | ● | ● |  | ● |  |  |  |  |
| CEDATA | SA 2123 | ● | ● | ● |  |  |  |  |  |  |  |  |  | ● | ● | ● |  |  |  |  |  |  |  |
| CEDATA | SA 2123AD | ● | ● | ● | ● | ● |  |  |  |  |  |  |  | ● | ● | ● | ● |  |  |  |  |  |  |
| CEDATA | SA 2123B | ● | ● | ● | ● | ● |  |  |  |  |  |  |  | ● | ● | ● | ● |  |  |  |  |  |  |
| CICADA | 300 | ● | ● |  |  |  |  |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |
| CICADA | 312 | ● | ● |  |  |  |  |  |  |  |  |  |  |  | ● |  | ● | ● |  |  | ● | ● | ● |
| CICADA | 312 | ● | ● |  |  |  |  |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |
| CONCORD DATA SYSTEMS | V.22 | ● |  |  |  |  | ● |  |  |  |  |  |  |  | ● | ● |  |  | ● |  |  |  |  |
| CONCORD DATA SYSTEMS | V.22 BIS | ● |  |  |  |  | ● |  | ● |  |  |  |  |  | ● | ● |  |  | ● |  |  |  |  |

| PABX support | Hayes compatible | Videotex s'ware supplied | TTY s'ware supplied | Speaker | Battery | Internal/External modem | Acc. coupler or Modem | Asynch/Synch | No indicator LEDS | Mains or Int power supply | Other features | Price,includingsales tax | Distributor | Telephone |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ● | ● | ● | ● | ● | | Int | M | Asynch | 0 | Int | COMES WITH FREE RS-232 TESTER | $1175 | DATACRAFT DIRECT MARKETING | 03-725-1144 |
| ● | ● | ● | ● | ● | | Int | M | Asynch | 0 | Int | - | $377 | DATACRAFT DIRECT MARKETING | 03-725-1144 |
| ● | | | | ● | | Int | M | Both | 9 | Mains | SOFT CONFIGURE. TONE/PULSE DIAL. ADAPTIVE EQUALISE | $1029 | CASE COMMUNICATION SYSTEMS | 02 451-6655 |
| | | | | | | Int | M | Synch | 11 | Mains | FALLBACK 72/48, SINGLE CARD, POWERFUL DIAGNOSTICS | $2340 | CASE COMMUNICATION SYSTEMS | 02 451-6655 |
| | | | | | | Int | M | Both | 11 | Mains | LOCAL REMOTE DIAGNOSTICS. LEASED LINE OR DIAL UP | $800 | CASE COMMUNICATION SYSTEMS | 02 451-6655 |
| ● | ● | | | ● | | Ext | M | Both | 7 | Mains | RACK MOUNT OPTION | $989 | ROSSER COMMUNICATIONS | 02 449 8233 |
| ● | | | | | ● | Ext | M | Asynch | 7 | Mains | RACK MOUNT OPTION. SYNC. HDX OPTION | $440 | ROSSER COMMUNICATIONS | 02 449 8233 |
| ● | ● | | | | | Ext | M | Asynch | 7 | Mains | RACK MOUNT OPTION | $594 | ROSSER COMMUNICATIONS | 02 449 8233 |
| ● | | | | | | Ext | M | Asynch | 7 | Mains | RACK MOUNT OPTION | $511 | ROSSER COMMUNICATIONS | 02 449 8233 |
| ● | | | | | ● | Ext | M | Asynch | 5 | Mains | SYNC. HDX OPTION | $280 | ROSSER COMMUNICATIONS | 02 449 8233 |
| ● | | | | | ● | Ext | M | Asynch | 5 | Mains | | $341 | ROSSER COMMUNICATIONS | 02 449 8233 |
| ● | ● | ● | | ● | | Ext | M | Both | 8 | Mains | RACK MOUNTABLE OPTIONAL | $988 | CONSOLIDATED ELECTRONICS LTD. | (03)4840791 |
| ● | | | | | ● | Ext | M | Asynch | 8 | Mains | BATTERY ADAPT OR RACK MOUNTABLE OPTIONAL | $440 | CONSOLIDATED ELECTRONICS LTD. | (03)4840791 |
| ● | ● | ● | | | | Ext | M | Asynch | 8 | Mains | RACK MOUNTABLE OPTIONAL | $594 | CONSOLIDATED ELECTRONICS LTD. | (03)4840791 |
| ● | | ● | | | | Ext | M | Asynch | 8 | Mains | RACK MOUNTABLE OPTIONAL | $511 | CONSOLIDATED ELECTRONICS LTD. | (03)4840791 |
| | | | | | | Ext | M | Asynch | 4 | Mains | NONE | $130 | CENTRE INDUSTRIES | 024515555 |
| ● | | ● | ● | | | Ext | M | Asynch | 1 | Mains | PC CABLE INCLUDED | $395 | SHUTTLE DATACOMM PTY. LTD. | 03 267 1011 |
| | | ● | | | | Ext | M | Asynch | 3 | Mains | NONE | $273 | CENTRE INDUSTRIES | 024515555 |
| ● | | | | | | Ext | M | Both | 23 | Mains | | $695 | DATACRAFT DIRECT MARKETING | 03-725-1144 |
| | | | | | | Ext | M | Both | 23 | Mains | - | $995 | DATACRAFT DIRECT MARKETING | 03-725-1144 |

# APC BUYERS' GUIDE: MODEMS

| Make | Model | Telecom approved | 300 Baud | 1200/75 Baud | 1200/75 speed conversion | 1200 HDX | 1200 FDX | 2400 HDX | 2400 FDX | 4800 HDX | 4800 FDX | 9600 HDX | 9600 FDX | 'Bell' standard | Auto originate | Auto answer | Auto dial | Auto re-dial | Auto speed sense | Dial back security | Dialling directory | Internal help | Xon/Xoff support |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATA BRIDGE DSP | DSP 1200 | ● | | | | ● | ● | | | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| DATA BRIDGE DSP | DSP 1230 | ● | ● | ● | ● | | ● | | | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| DATA BRIDGE DSP | DSP 1234 | ● | ● | ● | ● | ● | ● | ● | ● | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| DATA BRIDGE DSP | DSP 2400 | ● | | | | ● | ● | ● | ● | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| DATA BRIDGE | DSP 2400 | ● | | | | | ● | | ● | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| DATACRAFT | DCF-5096 | ● | | | | | | ● | ● | ● | ● | | ● | | | | | | | | | | |
| DATAPLEX | DPX-210 | ● | ● | | | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| DATAPLEX | DPX-215 | ● | ● | | | | ● | | ● | | ● | | ● | | | | | | | | | | |
| DATAPLEX | DPX-224 | ● | ● | ● | ● | ● | ● | ● | ● | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| DATAPLEX | DPX-224 | ● | ● | ● | ● | ● | ● | ● | ● | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| DATAPLEX | DPX-224/PC | ● | ● | ● | ● | ● | ● | ● | ● | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| DATAPLEX | DPX-296 | | | | | | ● | | | ● | | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| DATASAT | VTEX/CARD/ KIT | ● | ● | ● | ● | | | | | | | | | | ● | ● | ● | ● | ● | | | ● | |
| DATASAT | VTEX/DESK | ● | ● | ● | ● | | | | | | | | | | ● | ● | ● | ● | ● | | | ● | |
| DATASAT | VTEX/DESK/ KIT | ● | ● | ● | ● | | | | | | | | | | ● | ● | ● | ● | ● | | | ● | |
| DICK SMITH ELECTRONICS | X3300 DATA PHONE 1200 | ● | ● | | ● | ● | | | | | | | | ● | ● | ● | | | | | | | |
| DICK SMITH ELECTRONICS | X3301 DATA PHONE 300 | ● | ● | | | | | | | | | | | ● | ● | | | | | | | | |
| DOWTY INFORMATION SYSTEMS UK | SB-1223 | ● | | | | ● | | | | | | | | | ● | | | | | | | | |
| DOWTY INFORMATION SYSTEMS UK | SB-1275 | ● | | | | | | | | | | | | | ● | | | | | | | | |
| DOWTY INFORMATION SYSTEMS UK | SB-321 | ● | ● | | | | | | | | | | | | ● | | | | | | | | |

| PABX support | Hayes compatible | Videotex s'ware supplied | TTY s'ware supplied | Speaker | Battery | Internal/External modem | Acc coupler or Modem | Asynch/Synch | No indicator LEDS | Mains or Int power supply | Other features | Price,includingsales tax | Distributor | Telephone |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ● | ● | | | ● | | Ext | M | Both | 16 | Int | REMOTE CONFIGURE: DUMB MODE: EXTENSIVE DIAGNOST. | $1189 | **DATA BRIDGE** | 03 578 0814 |
| ● | ● | | | ● | | Ext | M | Both | 16 | Int | REMOTE CONFIGURE.DUMB MODE. EXTENSIVE DIAGNOST | $1085 | **DATA BRIDGE** | 03 578 0814 |
| ● | ● | | | ● | | Ext | M | Both | 16 | Int | REMOTE CONFIGURE: DUMB MODE: EXTENSIVE DIAGNOST. | $1283 | **DATA BRIDGE** | 03 578 0814 |
| ● | ● | | | ● | | Ext | M | Both | 16 | Int | REMOTE CONFIGURE; DUMB MODE; EXTENSIVE DIAGNOST. | $1606 | **DATA BRIDGE** | 03 578 0814 |
| | ● | | | ● | ● | Ext | M | Both | 14 | Mains | OPT. ERROR CORR'N REMOTE CONFIG | $1189 | **ROSSER COMMUNICATIONS** | 02 449 8233 |
| | | | | | | Ext | M | Synch | 4 | Mains | LEASED LINE.MULTI POINT.MUX OPTION. | $2002 | **DATAPLEX** | 03-735 3333 |
| | | | | | | Ext | M | Both | 4 | Mains | SHORT HAUL 4-WIRE LEASED LINE MODEMS | $589 | **ROSSER COMMUNICATIONS** | 02 449 8233 |
| | | | | | | Ext | M | Both | 4 | Mains | LEASED LINE OPERATION.19.2KBPS.SURGE SUPRESS | $995 | **DATAPLEX** | 03-735 3333 |
| ● | ● | ● | ● | ● | | Ext | M | Both | 6 | Mains | MNP CONSTANT SPEED DTE INTERFACE. AUTO LOG ON | $1680 | **DATAPLEX** | 03-735 3333 |
| | ● | | | ● | | Ext | M | Both | 6 | Mains | ERROR CORRECT'N, CONST SPEED I'FACE, REMOTE CONFIG | $1680 | **ROSSER COMMUNICATIONS** | 02 449 8233 |
| ● | ● | ● | ● | ● | | Int | M | Both | 0 | Int | MNP CONST. SPEED DTE INT'FACE ARQ AUTO LOG ON | $1500 | **DATAPLEX** | 03-735 3333 |
| | ● | | ● | ● | | Ext | M | Both | 6 | Mains | MNP.SPEED CONVERSION.DATA COMPRESSION. AUTO LOG ON | $3603 | **DATAPLEX** | 03-735 3333 |
| ● | ● | ● | ● | ● | | Int | M | Asynch | 0 | Int | PLUGS INTO A ONE-HALF IBM TYPE CARD SLOT | $555 | **DATASAT** | 02 821-1622 |
| ● | ● | | | ● | | Ext | M | Asynch | 4 | Mains | LOW COST AUTO-DIAL MODEM ONLY | $540 | **DATASAT** | 02 821-1622 |
| ● | ● | ● | ● | ● | | Ext | M | Asynch | 4 | Mains | VTEX/2 MSDOS SOFTWARE WITH MACRO WINDOWS | $720 | **DATASAT** | 02 821 1622 |
| | | | | | | Ext | M | Asynch | 8 | Mains | COMES WITH JUMPER BOX FOR VIATEL 1200/75 OPERATION | $349 | **DICK SMITH ELECTRONICS** | 02-8883200 |
| | | | | | | Ext | M | Asynch | 2 | Mains | | $199 | **DICK SMITH ELECTRONICS** | 02-8883200 |
| ● | | | | | | Int | M | Asynch | 4 | Mains | OPTIONAL AUTO-DIAL, AUTO-ANS, RACK-MOUNT MODEL | $354 | **CASE COMMUNICATION SYSTEMS** | 02 451-6655 |
| ● | | | | | | Int | M | Asynch | 4 | Mains | OPTIONAL A-ANS, A DIAL, SPEED CONV, RACKMOUNT | $354 | **CASE COMMUNICATION SYSTEMS** | 02 451-6655 |
| ● | | | | | | Int | M | Asynch | 4 | Mains | OPTIONAL AUTO-DIAL ,AUTO-ANS, RACK MOUNT MODEL | $234 | **CASE COMMUNICATION SYSTEMS** | 02 451-6655 |

# APC BUYERS' GUIDE: MODEMS

| Make | Model | Telecom approved | 300 Baud | 1200/75 Baud | 1200 75 speed conversion | 1200 HDX | 1200 FDX | 2400 HDX | 2400 FDX | 4800 HDX | 4800 FDX | 9600 HDX | 9600 FDX | 'Bell' standard | Auto originate | Auto answer | Auto dial | Auto re-dial | Auto speed sense | Dial back security | Dialling directory | Internal help | Xon/Xoff support |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DOWTY INFORMATION SYSTEMS UK | SB1212 SMARTMODEM | ● | | | | | ● | | | | | | | | ● | ● | | | | | | | ● |
| DOWTY INFORMATION SYSTEMS | QUATTRO UNIVERSAL | | ● | ● | ● | ● | ● | | ● | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| EVERCOM | EV-920 | | ● | | | ● | ● | | | | | | | ● | ● | ● | ● | ● | ● | | ● | ● | ● |
| EXCEL | 1221 | ● | ● | | | | | | | | | | | | ● | ● | | | | | | | |
| EXCEL | 1222 | | ● | | | | | | | | | | | | ● | ● | ● | ● | | | ● | ● | |
| INTERLINK ELECTRONICS | A-12/12-SX | ● | ● | ● | ● | ● | ● | | | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| INTERLINK ELECTRONICS | A-12/12-X | ● | ● | | ● | ● | ● | | | | | | | ● | ● | ● | ● | | | | | | |
| INTERLINK ELECTRONICS | A-12/75-X | ● | ● | | ● | | | | | | | | | ● | ● | ● | ● | | | | | | |
| INTERLINK ELECTRONICS | A-24/24-X | ● | ● | ● | ● | ● | ● | ● | ● | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| INTERLINK ELECTRONICS | M-12/75-X | ● | ● | | | | | | | | | | | ● | ● | | | | | | | | |
| LE MODEM | | ● | ● | | ● | | | | | | | | | ● | ● | ● | ● | | ● | | | | |
| MASTER SYSTEMS UK | MS9600 | ● | | | | | | | ● | ● | | ● | | | | | | | | | | | |
| MODEMPHONE | WD-1600 | | ● | | | | ● | | | | | | | ● | ● | ● | ● | ● | ● | | | | ● |
| NATASAT | VTEX/CARD | ● | ● | ● | ● | | | | | | | | | | ● | ● | ● | ● | ● | | | ● | |
| NETCOMM | 1200 A | ● | | | | | ● | | | | | | | ● | ● | ● | ● | | | | | | |
| NETCOMM | 1200 IN/MODEM | ● | ● | | | | ● | | | | | | | ● | ● | ● | ● | | ● | | ● | ● | ● |
| NETCOMM | 1200 SA | ● | | | | | ● | | | | | | | ● | ● | ● | ● | | | | | | |
| NETCOMM | 123 IN/MODEM | ● | ● | ● | ● | ● | ● | | | | | | | ● | ● | ● | ● | | ● | | ● | ● | ● |
| NETCOMM | 1234 A | ● | ● | ● | ● | | ● | | ● | | | | | ● | ● | ● | ● | | ● | | | | |
| NETCOMM | 1234 IN/MODEM | ● | ● | ● | ● | ● | ● | ● | ● | | | | | ● | ● | ● | ● | | ● | | ● | ● | ● |

| PABX support | Hayes compatible | Videotex s'ware supplied | TTY s'ware supplied | Speaker | Battery | Internal/External modem | Acc. coupler or Modem | Asynch/Synch | No indicator LEDS | Mains or Int power supply | Other features | Price.includingsales tax | Distributor | Telephone |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ● | | | | | | Int | M | Both | 7 | Mains | ERROR CORRECTION. OPTION A-DIAL/REDIAL RACKMOUNT | $594 | CASE COMMUNICATION SYSTEMS | 02 451-6655 |
| ● | ● | | | | | Int | M | Both | 6 | Mains | MULTI-MODE, AUTO-DIAL/LOGON/SPEED,ERROR CORRECTION | $1896 | CASE COMMUNICATION SYSTEMS | 02 451-6655 |
| | ● | | | ● | | Int | M | Asynch | - | Int | 132 COLUMN SUPPORT. AUTO DATA TO VOICE TRANSITION | NA | PERICOMP | 07-8399200 |
| | | | | ● | | Ext | M | Asynch | 4 | Mains | CAN BE UPWARD GRADABLE TO MODEL 1222 AUTODIAL | $350 | CPM DATA SYSTEMS PTY.LTD. | 03 6876790 |
| | ● | | ● | ● | | Ext | M | Asynch | 4 | Mains | CAN BE UPGRADED FROM MODEL 1221 FOR $100 | $450 | CPM DATA SYSTEMS PTY.LTD. | 03 6876790 |
| ● | ● | ● | ● | ● | ● | Ext | M | Both | 11 | - | - | $899 | INTERLINK ELECTRONICS | 03- 699 4177 |
| ● | ● | ● | ● | ● | ● | Ext | M | Both | 8 | Mains | - | $799 | INTERLINK ELECTRONICS | 03-699 4177 |
| ● | ● | ● | ● | ● | | Ext | M | Asynch | 6 | Mains | - | $450 | INTERLINK ELECTRONICS | 03-699 4177 |
| ● | ● | ● | ● | | ● | Ext | M | Both | 11 | Mains | - | $997 | INTERLINK ELECTRONICS | 03- 699 4177 |
| | | ● | ● | | | Ext | M | Asynch | 4 | Mains | - | $335 | INTERLINK ELECTRONICS | 03- 699 4177 |
| ● | ● | ● | ● | ● | | Int | M | Both | 0 | Int | AUSTRALIAN DESIGNED AND MANUFACTURED | $425 | IMAGINEERING | (02)662-4499 |
| | | | | | | Int | M | Synch | 6 | Mains | V27/V29 FALLBACK, SMALL SIZE, HIGH PERFORMANCE | $2340 | CASE COMMUNICATION SYSTEMS | 02 451-6655 |
| | ● | | ● | | | Ext | M | Asynch | 4 | Mains | INCLUDES HANDSET | $550 | ATLANTIS INTERNATIONAL PTY LTD | 03 277 3139 |
| ● | ● | | | ● | | Int | M | Asynch | 0 | Int | INTERNAL 1275/300 MODEM FOR IBM COMPATIBLES | $450 | DATASAT | 02 821-1622 |
| | ● | | | ● | | Ext | M | Asynch | 8 | Mains | - | $786 | ROSSER COMMUNICATIONS | 02 449 8233 |
| ● | ● | ● | ● | ● | | Int | M | Asynch | 0 | Int | INTERNAL FOR PC & COMPATIBLES | $834 | NETCOMM | (02)8885533 |
| | ● | | | ● | | Ext | M | Both | 8 | Mains | - | $926 | ROSSER COMMUNICATIONS | 02 449 8233 |
| ● | ● | ● | ● | ● | | Int | M | Asynch | 0 | Int | INTERNAL FOR IBM & COMPATIBLES | $1140 | NETCOMM | (02)8885533 |
| | ● | | | ● | | Ext | M | Asynch | 8 | Mains | - | $1445 | ROSSER COMMUNICATIONS | 02 449 8233 |
| ● | ● | ● | ● | ● | | Int | M | Asynch | 0 | Int | INTERNAL FOR PC & COMPATIBLES | $1414 | NETCOMM | (02)8885533 |

| Make | Model | Telecom approved | 300 Baud | 1200/75 Baud | 1200/75 speed conversion | 1200 HDX | 1200 FDX | 2400 HDX | 2400 FDX | 4800 HDX | 4800 FDX | 9600 HDX | 9600 FDX | Bell standard | Auto originate | Auto answer | Auto dial | Auto re-dial | Auto speed sense | Dial back security | Dialling directory | Internal help | Xon/Xoff support |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NETCOMM | 2400 IN/MODEM | ● | ● |  |  |  | ● |  | ● |  |  |  |  | ● | ● | ● | ● |  | ● |  | ● | ● | ● |
| NETCOMM | 9648 FT | ● |  |  |  |  |  |  |  |  | ● |  | ● |  | ● | ● | ● |  | ● |  |  |  |  |
| NETCOMM | AUTOMODEM 3+12 | ● | ● | ● | ● |  |  |  |  |  |  |  |  | ● |  |  | ● |  |  |  | ● | ● | ● |
| NETCOMM | DATALOCK 123SA | ● | ● | ● | ● | ● | ● |  |  |  |  |  |  | ● | ● | ● | ● |  | ● | ● | ● | ● | ● |
| NETCOMM | MODEM 3+12 | ● | ● | ● | ● |  |  |  |  |  |  |  |  | ● |  |  |  |  |  |  | ● | ● | ● |
| NETCOMM | MODEM 64/128 | ● | ● | ● | ● |  |  |  |  |  |  |  |  |  | ● | ● | ● | ● | ● |  | ● | ● | ● |
| NETCOMM | PC IN/MODEM | ● | ● | ● | ● |  |  |  |  |  |  |  |  | ● | ● | ● | ● |  | ● |  | ● | ● | ● |
| NETCOMM | SHARP PC IN/MODEM | ● | ● | ● | ● |  |  |  |  |  |  |  |  | ● | ● | ● | ● |  | ● |  | ● | ● | ● |
| NETCOMM | SMARTMODEM 1200A,SA | ● | ● |  |  |  | ● |  |  |  |  |  |  | ● | ● | ● | ● |  | ● |  | ● | ● | ● |
| NETCOMM | SMARTMODEM 1234A,SA | ● | ● | ● | ● | ● | ● | ● | ● |  |  |  |  | ● | ● | ● | ● |  | ● |  | ● | ● | ● |
| NETCOMM | SMARTMODEM 123A,SA | ● | ● | ● | ● | ● | ● |  |  |  |  |  |  | ● | ● | ● | ● |  | ● |  | ● | ● | ● |
| NETCOMM | SMARTMODEM 21/23A,SA | ● | ● | ● | ● | ● |  |  |  |  |  |  |  | ● | ● | ● | ● | ● | ● |  | ● |  | ● |
| NETCOMM | SMARTMODEM 2400A,SA | ● | ● |  |  |  | ● |  | ● |  |  |  |  | ● | ● | ● | ● |  | ● |  | ● | ● | ● |
| NETCOMM | SMARTMODEM 9648DP | ● |  |  |  |  |  | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |  | ● |  | ● | ● |  |
| NETCOMM | SMARTMODEM 9648FT | ● |  |  |  |  |  | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |  | ● |  | ● | ● |  |
| NETCOMM | SMARTMODEM 9648HD | ● |  |  |  |  |  | ● |  |  | ● |  | ● | ● | ● | ● | ● |  | ● |  | ● | ● |  |
| NETCOMM | TRAILBLAZER | ● |  |  |  | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |  | ● |  | ● |  | ● |
| NETCOMM | TRAILBLAZER -PC | ● |  |  |  | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |  | ● |  | ● |  | ● |
| NICE MODEM | 1 (CBM 64/128) | ● | ● | ● |  |  |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |
| NICE MODEM | 1 (RS232) | ● | ● | ● |  |  |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |

| PABX support | Hayes compatible | Videotex s'ware supplied | TTY s'ware supplied | Speaker | Battery | Internal/External modem | Acc coupler or Modem | Asynch/Synch | No indicator LEDS | Mains or int power supply | Other features | Price, including sales tax | Distributor | Telephone |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ● | ● | ● | ● | ● |  | Int | M | Asynch | 0 | Int | INTERNAL FOR PC & COMPATIBLES | $1125 | NETCOMM | (02)8885533 |
|  | ● |  |  | ● |  | Ext | M | Both | 7 | Mains | FAST TURNAROUND FOR 9600 BPS HDX SYNC. | $2887 | ROSSER COMMUNICATIONS | 02 449 8233 |
| ● |  | ● | ● | ● |  | Ext | M | Asynch | 8 | Mains |  | $565 | NETCOMM | (02)8885533 |
| ● | ● | ● | ● | ● |  | Ext | M | Both | 8 | Mains | ARQ PROTOCOL FOR ERROR PROTECTION | $1505 | NETCOMM | (02)8885533 |
| ● |  | ● | ● | ● |  | Ext | M | Asynch | 8 | Mains |  | $341 | NETCOMM | (02)88851533 |
| ● |  | ● | ● | ● |  | Ext | M | Asynch | 7 | Int | - | $341 | NETCOMM | (02)8885533 |
| ● | ● | ● | ● | ● |  | Int | M | Asynch | 0 | Int | INTERNAL FOR PC & COMPATIBLES | $615 | NETCOMM | (02)8885533 |
| ● | ● | ● | ● |  |  | Int | M | Asynch | 0 | Int | INTERNAL MODEM FOR SHARP PC 7000 PORTABLE COMPUTER | $599 | NETCOMM | (02)8885533 |
| ● | ● | ● | ● | ● |  | Ext | M | Both | 8 | Mains | - | $898 | NETCOMM | (02)8885533 |
| ● | ● | ● | ● | ● |  | Ext | M | Both | 8 | Mains | - | $1651 | NETCOMM | (02)8885533 |
| ● | ● | ● | ● | ● |  | Ext | M | Both | 8 | Mains |  | $1355 | NETCOMM | (02)8885533 |
| ● | ● | ● | ● | ● |  | Ext | M | Both | 8 | Mains | - | $677 | NETCOMM | (02)8885533 |
| ● | ● | ● | ● | ● |  | Ext | M | Both | 8 | Mains | - | $1221 | NETCOMM | (02)8885533 |
| ● | ● |  |  | ● |  | Ext | M | Synch | 10 | Mains | - | $2252 | NETCOMM | (02)8885533 |
| ● | ● |  |  | ● |  | Ext | M | Synch | 10 | Mains | 22 MILLISECOND RETRAIN IN HALF DUPLEX APPLICATIONS | $3300 | NETCOMM | (02)8885533 |
| ● | ● |  |  | ● |  | Ext | M | Synch | 10 | Mains | FOR HALF DUPLEX LEASED LINE OR PSTN APPLICATIONS | $1933 | NETCOMM | (02)8885533 |
|  | ● |  |  | ● |  | Ext | M | Asynch | 8 | Mains | 18,000 BPS. ERROR CORRECTING. ADAPTS TO PHONE LINE | $3468 | ROSSER COMMUNICATIONS | 02 449 8233 |
|  | ● |  | ● | ● |  | Int | M | Asynch | 0 | Int | 18,000 BPS ERROR CORRECTING, ADAPTS TO PHONE LINE | $3248 | ROSSER COMMUNICATIONS | 02 449 8233 |
|  |  | ● | ● |  |  | Ext | M | Both | 5 | Mains | ONLY CAN BE USED OF COMMODORE COMPUTERS (64 & 128) | $299 | NICE COMPUTER COMPANY PTY LTD | (09)321-6636 |
|  |  |  |  |  |  | Ext | M | Both | 5 | Mains | CAN BE MODIFIED FOR SOFTWARE AUTO ANSWER/DAIL | $279 | NICE COMPUTER COMPANY PTY LTD | (09)321-6636 |

| Make | Model | Telecom approved | 300 Baud | 1200/75 Baud | 1200/75 speed convers on | 1200 HDX | 1200 FDX | 2400 HDX | 2400 FDX | 4800 HDX | 4800 FDX | 9600 HDX | 9600 FDX | 'Bell' standard | Auto originate | Auto answer | Auto dial | Auto re-dial | Auto speed sense | Dial back security | Dialling directory | Internal help | Xon/Xoff support |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NICE MODEM | 2 | ● | ● | ● | ● | ● | ● | | | | | | | ● | ● | ● | ● | | ● | ● | ● | ● | |
| PULSAR SAM | SAM | ● | ● | ● | ● | | ● | | | | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| SCITEC COMMUNICATION SYSTEMS | BUSINESS 14.4 | ● | | | | | | | | | | | | | | | | | | | | | |
| SCITEC COMMUNICATION SYSTEMS | BUSINESS 2123 | ● | ● | ● | ● | ● | | | | | | | | ● | ● | ● | ● | | ● | | | ● | |
| SCITEC COMMUNICATION SYSTEMS | BUSINESS 2200 | ● | ● | | | | ● | | | | | | | ● | ● | ● | ● | ● | | ● | ● | ● | |
| SCITEC COMMUNICATION SYSTEMS | BUSINESS 2400 | ● | | | | | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | |
| SCITEC COMMUNICATION SYSTEMS | BUSINESS 9600 | ● | | | | | | | | | | ● | | | | | | | | | | | |
| SCITEC COMMUNICATION SYSTEMS | BUSINESS OLYMPIC | ● | ● | ● | ● | | ● | | ● | | | | | ● | ● | ● | ● | | ● | | | ● | |
| SCITEC COMMUNICATION SYSTEMS | BUSINESS TRISTAR | ● | ● | ● | ● | | ● | | | | | | | ● | ● | ● | ● | | ● | | | ● | |
| SENDATA | 1200 FDAA | ● | | | | | ● | | | | | | | | ● | ● | | | | | | | |
| SENDATA | 1275 | ● | ● | ● | | | | | | | | | | ● | ● | | | ● | | | | | ● |
| SENDATA | 1275 AD | ● | ● | ● | ● | | | | | | | | | ● | ● | | ● | ● | | | | | ● |
| SENDATA | 1275INT | ● | ● | ● | ● | | | | | | | | | | ● | ● | ● | ● | ● | | | | ● |
| SENDATA | 2000 | ● | ● | ● | ● | ● | | | | | | | | ● | ● | ● | | ● | | | | | ● |
| SENDATA | 2927 | ● | | | | | ● | | ● | ● | ● | ● | ● | | | | | | | | | | ● |
| SENDATA | 321AA | ● | ● | ● | | | ● | | | | | | | ● | ● | ● | | ● | ● | | | | ● |
| SENDATA | 321AD | ● | ● | ● | ● | ● | ● | | | | | | | | ● | ● | ● | ● | ● | ● | | | ● |
| SENDATA | 321ADINT | ● | ● | ● | ● | | ● | | ● | | | | | | ● | ● | ● | ● | ● | | | | ● |
| SENDATA | 4321AD | ● | ● | ● | ● | ● | ● | ● | ● | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| SENDATA | 4321ADINT | ● | ● | ● | ● | ● | ● | | ● | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | |

| PABX support | Hayes compatible | Videotex s'ware supplied | TTY s'ware supplied | Speaker | Battery | Internal/External modem | Acc. coupler or Modem | Asynch/Synch | No indicator LEDS | Mains or Int power supply | Other features | Price,includingsales tax | Distributor | Telephone |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ● | ● | | | ● | | Ext | M | Both | 8 | Mains | ROM SLOT FOR OPTIONAL CUSTOM ROM. (USE Z80A CPU) | $699 | NICE COMPUTER COMPANY PTY LTD | (09)321-6636 |
| ● | ● | ● | ● | ● | | Ext | M | Asynch | 9 | Int | VIDEOTEXT ON DUMB TERMINALS, ALL MODE AUTO SENSE | $862 | PULSAR ELECTRONICS P/L | 03 3302555 |
| | | | | | | Ext | M | Synch | 10 | Mains | 14.4KBPS LEASED LINE OPERATION.ADAPTIVE EQU.DIAGS | $7960 | SCITEC COMMUNICATION SYSTEMS | 02 4289555 |
| ● | ● | | | ● | | Ext | M | Asynch | 11 | Mains | TERMINAL COMPATIBILITY CONTROLS,INT DIAGNOSTICS | $632 | SCITEC COMMUNICATION SYSTEMS | 02 4289555 |
| ● | ● | | | ● | | Ext | M | Both | 11 | Mains | LEASED LINE OR PSTN OPERATION. 50 NUM DIALBACK OPT | $874 | SCITEC COMMUNICATION SYSTEMS | 02 4289555 |
| ● | ● | | | ● | | Ext | M | Both | 11 | Mains | LEASED LINE OR PSTN OPERATION. 50 NUM DIALBACK OPT | $1472 | SCITEC COMMUNICATION SYSTEMS | 02 4289555 |
| | | | | | | Ext | M | Synch | 10 | Mains | LEASED LINE OPERATION.AUTO ADAPTIVE EQU. INT DIAGS | $3427 | SCITEC COMMUNICATION SYSTEMS | 02 4289555 |
| ● | ● | | | ● | | Ext | M | Both | 13 | Mains | AUTO ADAPTIVE EQUALISATION,INT DIAGNOSTICS | $1725 | SCITEC COMMUNICATION SYSTEMS | 02 4289555 |
| ● | ● | | | ● | | Ext | M | Both | 12 | Mains | AUTO ADAPTIVE EQUALISATION,INT DIAGNOSTICS | $1472 | SCITEC COMMUNICATION SYSTEMS | 02 4289555 |
| | | | | ● | | Ext | M | Both | 10 | Mains | - | $759 | ROSSER COMMUNICATIONS | 02 449 8233 |
| ● | | | | | | Ext | M | Asynch | 5 | Mains | - | $312 | SENDATA | 035686299 |
| ● | | ● | ● | | | Ext | M | Asynch | 5 | Mains | - | $432 | SENDATA | 035686299 |
| ● | ● | | | ● | | Int | M | Asynch | 0 | Int | - | $660 | SENDATA | 035686299 |
| ● | | | | | | Ext | M | Both | 6 | Mains | - | $660 | SENDATA | 035686299 |
| | | | | | | Ext | M | Synch | 14 | Mains | - | $1800 | SENDATA | 035686299 |
| ● | | | | ● | | Ext | M | Both | 9 | Mains | - | $1104 | SENDATA | 035686299 |
| ● | ● | | | ● | | Ext | M | Both | 9 | Mains | - | $1296 | SENDATA | 035686299 |
| ● | ● | ● | ● | ● | | Int | M | Asynch | 0 | Int | - | $1260 | SENDATA | 035686299 |
| ● | ● | | | ● | | Ext | M | Both | 14 | Mains | - | $1740 | SENDATA | 035686299 |
| ● | ● | ● | ● | ● | | Ext | M | Both | 0 | Int | COMMON PORT SPEED, 6 PROGRAMABLE HAYES CONFIG'S | $1656 | SENDATA | 035686299 |

| Make | Model | Telecom approved | 300 Baud | 1200/75 Baud | 1200/75 speed conversion | 1200 HDX | 1200 FDX | 2400 HDX | 2400 FDX | 4800 HDX | 4800 FDX | 9600 HDX | 9600 FDX | 'Bell' standard | Auto originate | Auto answer | Auto dial | Auto re-dial | Auto speed sense | Dial back security | Dialling directory | Internal help | Xon/Xoff support |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SENDATA | 700B ACOUSTIC CPLR. | ● | ● | | | | | | | | | | | | ● | | | | | | | | |
| SENDATA | 700 BV COUPLER | ● | | ● | | ● | | | | | | | | | | | | | | | | | |
| SENDATA | 700F | ● | ● | | | | | | | | | | | | | | | | | | | | |
| SENDATA | 700M | ● | ● | ● | | ● | | ● | | | | | | ● | | | | | | | | | ● |
| SENDATA | SD1222 | ● | | | | | ● | | | | | | | | ● | ● | | | | | | | |
| SENDATA | SENDATA GAURD | ● | | | | | | | | | | | | | | | | | | | | | |
| SENDATA | V21/V22/V23 | ● | ● | ● | ● | ● | ● | | | | | | | ● | ● | ● | | | ● | | | | ● |
| SENDATA | V22 | ● | | | | | ● | | | | | | | ● | ● | ● | | ● | | | | | ● |
| SENDATA | V22AD | ● | | | | | ● | | | | | | | ● | ● | ● | ● | ● | | | | | ● |
| SENDATA | V22BIS | ● | | | | | ● | | ● | | | | | ● | ● | ● | ● | ● | ● | | | | ● |
| SHUTTLE | 123 | ● | ● | ● | ● | ● | ● | | | | | | | ● | ● | ● | ● | | ● | | | | ● |
| SHUTTLE | 312AD | ● | ● | ● | ● | ● | | | | | | | | ● | ● | ● | ● | | | | | | ● |
| SHUTTLE | EXPRESS 12 | ● | ● | | | | ● | | | | | | | ● | ● | ● | ● | ● | ● | | ● | ● | ● |
| SHUTTLE | LIGHTNING 24 | ● | ● | | | | ● | | ● | | | | | ● | ● | ● | ● | ● | ● | | ● | ● | ● |
| SHUTTLE | RACE 1 | ● | ● | | | | ● | | ● | ● | | ● | | ● | ● | ● | ● | ● | ● | | ● | ● | ● |
| SHUTTLE | RACE 2 | ● | ● | | | | ● | | ● | ● | | ● | | ● | ● | ● | ● | ● | ● | | ● | ● | ● |
| SHUTTLE | RACE BMX | ● | | | | | | | | | ● | | ● | | ● | ● | ● | ● | ● | | ● | ● | ● |
| SHUTTLE | RALLY | | | | | | | ● | ● | ● | ● | ● | ● | | | | | | | | | | ● |
| SHUTTLE | SECURE 12 | ● | ● | | | | ● | | | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| SHUTTLE | SECURE 24 | ● | ● | | | | ● | | ● | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

| PABX support | Hayes compatible | Videotex s'ware supplied | TTY s'ware supplied | Speaker | Battery | Internal External modem | Acc. coupler or Modem | Asynch/Synch | No indicator LEDS | Mains or Int power supply | Other features | Price, including sales tax | Distributor | Telephone |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  | ● | ● | Ext | A | Asynch | 1 | Mains | BATTERY/MAINS PWR BOTH STANDARD | $286 | ROSSER COMMUNICATIONS | 02 449 8233 |
|  |  |  |  | ● |  | Ext | A | Asynch | 1 | Mains | - | $402 | ROSSER COMMUNICATIONS | 02 449 8233 |
| ● |  |  |  |  | ● | Ext | A | Asynch | 3 | Int | - | $299 | SENDATA | 035686299 |
| ● |  |  |  |  | ● | Ext | A | Both | 3 | Int | - | $354 | SENDATA | 035686299 |
|  |  |  |  |  |  | Int | M | Both | 7 | Mains | COMPACT V22. EXT MAINS AUTO/MANUAL OPERATION | $640 | CASE COMMUNICATION SYSTEMS | 02 451-6655 |
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| ● |  |  |  |  |  | Int | M | Both | 11 | Int | RACK MOUNTED CARD VERSIONS OF UP TO 14 MODEMS | $612 | SENDATA | 035686299 |
| ● |  |  |  |  |  | Ext | M | Both | 9 | Mains | - | $792 | SENDATA | 035686299 |
| ● | ● |  |  | ● |  | Ext | M | Both | 9 | Mains |  | $1056 | SENDATA | 035686299 |
| ● | ● |  |  | ● |  | Ext | M | Both | 14 | Mains | - | $1488 | SENDATA | 035686299 |
| ● | ● |  |  | ● | ● | Ext | M | Asynch | 8 | Mains |  | $998 | SHUTTLE DATACOMM PTY. LTD. | 03 267 1011 |
| ● | ● |  |  |  | ● | Ext | M | Asynch | 8 | Mains | - | $594 | SHUTTLE DATACOMM PTY. LTD. | 03 267 1011 |
| ● | ● |  |  | ● | ● | Ext | M | Asynch | 8 | Mains |  | $890 | SHUTTLE DATACOMM PTY. LTD. | 03 267 1011 |
| ● | ● |  |  |  |  | Ext | M | Both | 8 | Mains | OPTIONAL MNP ERROR CORRECTION | $895 | SHUTTLE DATACOMM PTY. LTD. | 03 267 1011 |
| ● | ● |  |  | ● |  | Ext | M | Asynch | 13 | Mains | INCL ERROR CORRECTION, DATARATE TO 14000 BPS FDX | $3250 | SHUTTLE DATACOMM PTY. LTD. | 03 267 1011 |
| ● | ● |  |  | ● |  | Ext | M | Asynch | 13 | Mains | INCL 2ND MULTIPLEXED PRINTER PORT | $3700 | SHUTTLE DATACOMM PTY. LTD. | 03 267 1011 |
| ● |  |  |  | ● |  | Ext | M | Asynch | 13 | Mains | DATARATES TO 17000 BPS. ERROR CORRECTED. DIALUP | $2750 | SHUTTLE DATACOMM PTY. LTD. | 03 267 1011 |
|  |  |  |  |  |  | Ext | M | Synch | 6 | Mains | LEASED LINE MODEM WITH OPT. INT. TDM OR STAT MUX. | $2500 | SHUTTLE DATACOMM PTY. LTD. | 03 267 1011 |
| ● | ● |  |  | ● | ● | Ext | M | Asynch | 8 | Mains | INCL. 2 PASSWORD LEVELS | $990 | SHUTTLE DATACOMM PTY. LTD. | 03 267 1011 |
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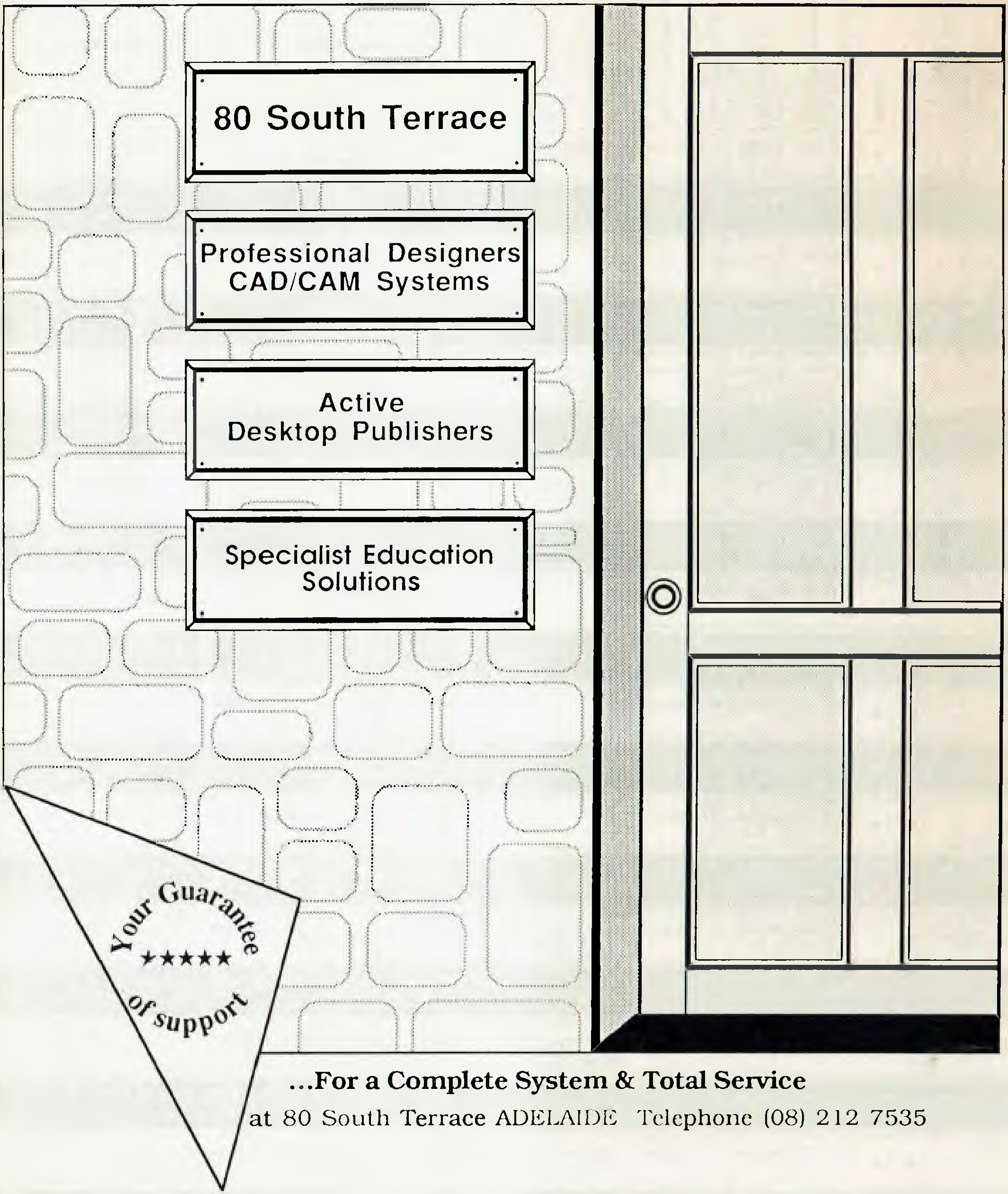
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| Make | Model | Telecom approved | 300 Baud | 1200/75 Baud | 1200 75 speed conversion | 1200 HDX | 1200 FDX | 2400 HDX | 2400 FDX | 4800 HDX | 4800 FDX | 9600 HDX | 9600 FDX | Bell standard | Auto originate | Auto answer | Auto dial | Auto re-dial | Auto speed sense | Dial back security | Dialling directory | Internal help | Xon/Xoff support |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SHUTTLE | VOLKSMODEM 12 | ● | ● |  |  |  | ● |  |  |  |  |  |  | ● | ● | ● | ● |  | ● |  |  |  |  |
| SMARTEAM. | 1200AT |  | ● |  |  | ● | ● |  |  |  |  |  |  | ● | ● | ● |  |  |  |  |  |  | ● |
| SMARTEAM | 1200 CT |  | ● |  |  | ● | ● |  |  |  |  |  |  | ● | ● | ● | ● |  |  |  |  |  | ● |
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| SMARTEAM | V.21/V.23 |  | ● | ● | ● | ● |  |  |  |  |  |  |  | ● | ● | ● | ● |  |  |  |  |  |  |
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| TELECOM 300 BPS. LEASED LINE | ITEM 878 | ● | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| TELECOM 1200 BPS. LEASED LINE | ITEM 316 | ● |  |  |  | ● | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| TELECOM 1200 BPS.SWITCHED LINE | ITEM 317 | ● |  |  |  | ● |  |  |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |
| TELECOM 24/48/96/19.2 KBIT/S | ITEM 2300 | ● |  |  |  | ● | ● | ● | ● | ● | ● | ● | ● |  |  |  |  |  |  |  |  |  |  |
| TELECOM 2400 BPS. LEASED LINE | ITEM 1822 | ● |  |  |  |  | ● |  | ● |  |  |  |  |  | ● | ● | ● | ● |  |  |  |  |  |
| TELECOM 32-72 KBIT/S LEASED | ITEM 1800 | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| TELECOM 4 IN 1 AUTO MODEM | TEL 424 AVAIL. 7/97 | ● | ● |  | ● | ● | ● |  | ● |  |  |  |  | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| TELENETICS | 12I | ● |  |  |  |  | ● |  |  |  |  |  |  | ● | ● | ● | ● |  | ● |  |  |  |  |
| TELENETICS | 24I | ● |  |  |  |  | ● |  | ● |  |  |  |  | ● | ● | ● | ● |  | ● |  |  |  |  |
| VOICE BAND LEASED LINE | ITEM 2200 | ● |  |  |  |  |  | ● | ● | ● | ● | ● | ● |  |  |  |  |  |  |  |  |  |  |

| PABX support | Hayes compatible | Videotex s'ware supplied | TTY s'ware supplied | Speaker | Battery | Internal/External modem | Acc coupler or Modem | Asynch/Synch | No indicator LEDS | Mains or Int power supply | Other features | Price,includingsales tax | Distributor | Telephone |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ● | ● | | | | ● | Ext | M | Asynch | 2 | Mains | DATA CABLE INCLUDED | $595 | SHUTTLE DATACOMM PTY. LTD. | 03 267 1011 |
| | ● | | | ● | ● | Ext | M | Asynch | 8 | Mains | - | $700 | ABE COMPUTERS. | 03-288-2144 |
| | ● | | | ● | ● | Ext | M | Asynch | 8 | Mains | - | $750 | ABE COMPUTERS | 03-288-2144 |
| | ● | | | ● | | Int | M | Asynch | 0 | Int | - | $980 | ABE COMPUTERS | 03-288-2144 |
| | ● | | | ● | | Ext | M | Both | 8 | Mains | - | $550 | ABE COMPUTERS. | 03-288-2144 |
| ● | ● | | | ● | | Ext | M | Asynch | 8 | Mains | 18000BPS ERROR FREE OVER DIAL-UP LINES | $3468 | NETCOMM | (02)8885533 |
| ● | ● | | ● | ● | | Int | M | Asynch | 0 | Int | 18000BPS ERROR FREE OVER DIAL-UP LINES | $3242 | NETCOMM | (02)8885533 |
| | | | | | | Ext | M | Asynch | 3 | Mains | DESK TOP HOUSING ,V.21 ,LONG DISTANCE | $264 | TELECOM AUSTRALIA | 03 606.7771 |
| | | | | | | Ext | M | Asynch | 3 | Mains | DESK TOP HOUSING, SOFT CARRIER TURN OFF | $516 | TELECOM AUSTRALIA | 03 606.7771 |
| | | | | | | Ext | M | Both | 6 | Mains | DATEL PLINTH,DATA RATE FALLBACK,LONG DISTANCE | $744 | TELECOM AUSTRALIA | 03 606.7771 |
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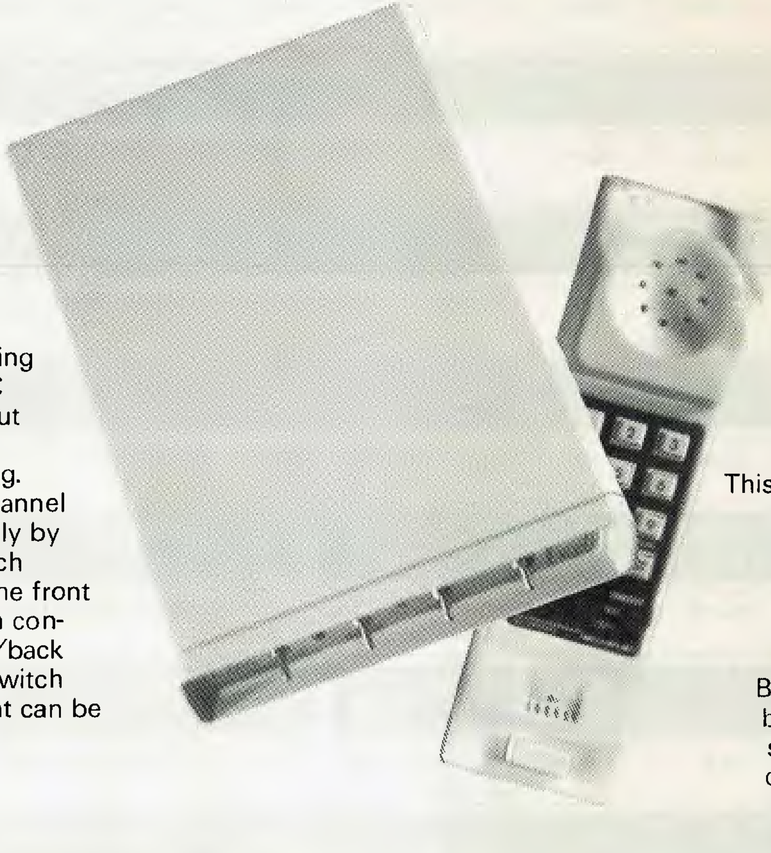
| | | | | | | Ext | M | Both | 8 | Mains | AUTO DISCONNECT,LODPBACK TIMING RATE FALLBACK | $2424 | TELECOM AUSTRALIA | 03 606.7771 |
| | | | | | | Ext | M | Synch | 7 | Mains | LOCAL AREA USE ONLY | $3672 | TELECOM AUSTRALIA | 03 606.7771 |
| ● | ● | ● | ● | ● | | Ext | M | Both | 6 | Mains | ARQ ERROR DETECTION, MNP AND SURELINK PROTOCOLS | $1800 | TELECOM AUSTRALIA | 03 606.7771 |
| ● | ● | | ● | ● | | Int | M | Asynch | 0 | Int | INCLUDES "RELAY" COMMUNICATIONS SOFTWARE | $595 | DATACRAFT DIRECT MARKETING | 03-725-1144 |
| ● | ● | | ● | ● | | Int | M | Asynch | 0 | Int | COMES WITH "RELAY" COMMUNICATIONS SOFTWARE | $895 | DATACRAFT DIRECT MARKETING | 03-725-1144 |
| | | | | | | Ext | M | Synch | 14 | Mains | CCITT V27 & V29. V54 LOOP. HD AVAIL. LONG DISTANCE | $2436 | TELECOM AUSTRALIA | 03.606.7771 |

## EXCEL

# MODEMS

## * shortly with Auto Dial *

The EXCEL range of FSK data modems have been specifically designed to be as simple as possible to set up and operate for the first time user who has no technical knowledge of computers. They use the latest technology available including digital filters so as to give stable and reliable performance at all times.



By using line multiplexing only a simple RS232-C cable is required without any complicated and expensive line switching. The main/back data channel selection is made simply by operating a single switch which is mounted on the front panel of the modem. In conjunction with the main/back switch and the mode switch any data channel format can be easily set up.

This enables switching from computer Bulletin Board Systems (BBS.) which operate at 300 baud (bits per second) both originate and answer to the new high speed BBS which operate 1200 baud main channel and a slow back channel of 75 can be originate with the other being the answer. (VIATEL* uses 75 baud originate with 1200 baud answer.)

*VIATEL registered trademark of TELECOM AUSTRALIA

## *Specifications*

| | |
|---|---|
| Digital data format | Serial, asynchronous, RS232-C compatible<br>TD, RD, RTS, CTS, CD, DTR. |
| Modulation technique | Binary, phase-coherent Frequency Shift Keying (FSK) |
| Transmit output level | −3dBm into 600 ohms |
| Frequency accuracy | ± 0.4Hz all modes except Bell 202 (mark)<br>± 1.0Hz Bell 202 (mark) |
| Transmit harmonics | −45dB from fundamental for single tone |
| Telephone line impedance | 600 ohms |
| DC holding resistance | 320 ohms |
| Demodulation technique | differential FM detection |
| Receiver sensitivity | 0dBm to −48dBm |
| Freuency deviation | ± 16Hz |
| Carrier threshold | ON −43dBm ± 1dB<br>OFF −48dBm ± 1dB |
| Operating temp. | 0 to +45 degrees C. |
| Power requirements | A.C. Model<br>230 volts A.C. ± 20 volts A.C.<br>16 milliamps A.C. |
| Physical dimensions | width 138mm height 45mm depth 190mm.<br>high-impact polystyrene, light grey. |

TELECOM AUTHORISATION NO. CB5/37/1377

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## Super Modem 1234SA

This one has it all! Operates at 2400, 1200, 1200/75 Viatel (with built in 1200 full duplex speed converter) and 300 bps to enable you to talk to any CCITT standard modem (Supports Bell 212A and Bell 103 too!)

The 1234SA operates sync and async and has automatic adaptive equalisation for virtually error-free data transmission. Super Modem 123SA also available for speeds up to 1200 bps FDX.

PRICE: 1234SA – **$1309.00**
123SA – **$1095.00**

## Super Modem 2400A

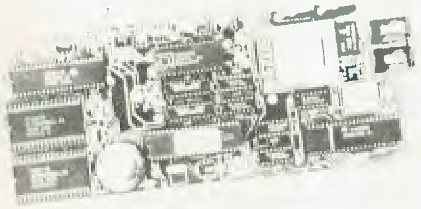
Supports speeds of 2400 bps (V.22 bis) and 1200 bps (V 22) asynchronously. Lower cost unit where single speeds only are required.

PRICE: 2400A – **$959.00**
1200A – **$685.00**

## Super Modem 21/23

Suitable for use on the Viatel service. Has a built in speed converter to change 1200/75 bps to 1200/1200 bps for terminals and PC's which don't operate at split speeds. Also communicates at 300 bps for file transfer with other PC's or users. Comes complete with standard communications software.

PRICE: 21/23A – **SOLD OUT!**



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3 Models – 1234, 123, Viatel

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PRICE: PC1234 – **$1175.00**
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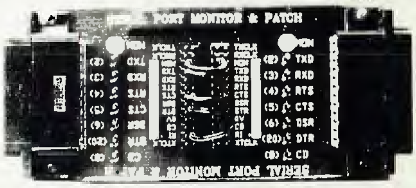

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# Digital telephones

***Communications in Australia will shortly be facing one of the greatest revolutions since the introduction of telephony itself. By mid-1988, Telecom Australia's customers should be able to apply for an optional service enabling dial-up, fully digitised transmission of everything from voice to TV signals, computer transmissions to high-resolution facsimile — or even a mix of the lot. Chris Edmondson reports.***

What will this new technology mean to industry? It's quite simple, really. A new network is being designed where a user can dial — in a similar way to using a normal telephone — into another suburb, or right across the country. While offering the convenience and ease of the public network, the new medium will offer facilities which can normally be offered only by a dedicated digital link.

For some time now, Telecom Australia has offered its major business clients a high-capacity digital link called the Two Megabit (2 Mbits/sec) service. The use of 2 Mbits means that a user would be able to conduct a mix of up to 30 phone conversations, fax, telex, data, TV pictures and audio, or other forms of communication to a total traffic level of two million bits of digital information per second.

However, while the 2 Mbit service offered the customer the capacity for a variety of traffic types at a high density, the customer had first to identify the two points such a line would serve — and then be prepared to pay the relatively high costs associated with operating the service. The main point, of course is that the use of a dedicated line could not ever match the versatility of a switched network. It's like comparing a normal phone which can dial anywhere to an intercom which goes to one place only.

Telecom's new development, called Integrated Services Digital Network, ties the best features of the Two Megabit thinking into the dial-up simplicity of the Public Switched Telephone Network, known as the PSTN.

The end result will be a series of advanced electronic voice and data exchanges, along with a number of totally new installations. Andrew Lockwood, marketing manager for Telecom's Dedicated Network Services team — which oversees ISDN — described the new network as 'essentially an overlay, using some parts of the present network, and adding additional systems in the most cost-effective way possible'.

> *'The basic service will provide data transmission, teletex service, high-resolution videotex, high-speed facsimile reception to an associated printer, call charge and called number displays, and ports for attaching non-ISDN terminal or telephone equipment.'*

ISDN will enjoy a range of features not previously enjoyed on *any* dial-up network in this country. The basic service will provide a handset with advanced features, as well as data transmission, teletex service, high-resolution videotex (Telecom calls it 'Picture Viatel', but it may well be a case of *if* rather than *when* it becomes available), high-speed facsimile reception to an associated printer (transmission is an optional extra), call charge and called number displays, and ports for attaching non-ISDN terminal or telephone equipment.

The standards employed by ISDN will conform to CCITT specifications, which should ensure an element of international compatibility. Telecom actually sees ISDN growing through evolution, rather than revolution, so the initial standards chosen aren't likely to be changed in a hurry.

Business needs for the product, identified by Telecom as requiring special consideration, are:

- a general improvement of performance and facilities
- greater ease of use and management
- potential for new business opportunities
- cost reduction

Telecom says any new technology or system must deliver at least one of these benefits. It also says ISDN has the potential to deliver them all.

According to Telecom's Norman Gale, a key figure in ISDN strategies, 'Telecom Australia expects users will want to connect their large PABX sites to ISDN first, and later expand their networks to smaller branch offices. Then they will want to connect their corporate and branch networks to those of their suppliers and their customers. The public ISDN is the one network which makes this connectivity possible'.

ISDN will be characterised by its use of a control channel, which will be separate from the information channels. The control channel should allow users to communicate with the controlling computers, to specify the mix of services provided.

In other words, the individual user will be able to reconfigure his service, changing bandwidths, or adding other features when they become available.

Dialling through the network should be much faster than through the current analogue system. Telecom ex-

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pects a maximum connect delay of around one to two seconds — and that's from the time you *start* to dial the numbers!

ISDN controls, although complex, should be relatively simple to master. The fully-computerised control system will be using specially tailored chips which Telecom expects to become available from late this year. The network complexity will hide within the chip — the customer should have little or no more difficulty with the system than with a standard phone.

Despite ISDN's launch still being well over a year away, Telecom has recently announced a tentative pricing package for the product, primarily to gauge market reaction to the proposals. The prices will be determined by the level and type of access sought by the customer.

Charging will be based on four major components:

- call and usage charges
- an annual rental or subscription fee
- an annual access channel rental
- dedicated circuit and point-to-point fees

Installation and service modification fees will also apply.

There will initially be two levels of access. The upper, Primary Rate, will provide a number of features for the corporate user, with the greatest application in the linking of private automatic branch exchanges (PABXs) to permit the dial-up transfer of integrated text and voice services.

When introduced, the lower Basic Rate will operate at 144kbits/s, offering exactly the same range of features as the upper level, but at a lower cost. Telecom expects Basic ISDN to be popular with small to medium-sized businesses.

Primary ISDN will be similar to the current 2Mbit dedicated line, but with the dial-up convenience. Primary ISDN is targeted at major businesses with a high rate of information transfer between a number of outpost offices. The use of ISDN should offer these businesses high-capacity lines at a rate well below present dedicated line costs.

For either service, Telecom proposes an annual charge of $1000 per site serviced to get the ball rolling. Access rental shows up the difference between the two rates of service. The start-up point for Primary ISDN is 20 cable-delivered channels for a proposed $4140 per annum, with additional channels, in lots of 10, for an additional $2070 per lot.

Basic ISDN is not expected to be released until mid-1989, and Telecom has not yet provided the range of charges for this service. However, it is expected to cost proportionately less than the Primary rate.

A further, 'baby' ISDN is planned for an introduction in the early 1990's, and should offer similar benefits for individuals.

Usage charges will be a completely variable item, taking advantage of the exchange electronics for a range of prices. Put simply, the cheapest application to use on ISDN will be voice — at a price very similar to STD rates. Next on the scale will be broadcast-quality audio, for roughly another 5%, with digital data anything from 10% to 25% more again.

Point-to-point rentals will be based on related thinking to current dedicated lines, where distance is the deciding factor in the cost. A typical charge would be for a 64kbit line between Sydney and Melbourne, which is expected to cost around $18,000 per annum. However, the cost for Sydney all the way to Perth for a similar cable would be only $4250 more, at $22,500.

According to Telecom's Andrew Lockwood, the tariffs shown here are only an indication of the final rates. He said: 'We'll have to get customer reactions before we can fine-tune the final rates, and those won't be available for perhaps six months yet'.

Telecom expects ISDN to revolutionise the entire Australian communications arena. As it has been based on high-quality, end to end digital transmission technology, ISDN will allow virtually noise-free simultaneous voice and data links capable of operating at extremely high data transmission speeds.

David Gannon, manager of Telecom's dedicated network services, said ISDN 'has a tremendous potential. It makes possible a whole range of new applications, many of which we can't even foresee today. I'm sure there will be many entrepreneurs exercising their minds to work out the best way to utilise the new network'.

The bottom line of ISDN must surely lie with its range of applications to business. I suspect the greatest limiting factor of ISDN may well be the imaginations of its users.

A whole new world of lucrative customer benefits awaits those businesses prepared to put advanced domestic and corporate services through the cables. And for the largest of companies, ISDN may well revolutionise the whole gamut of external office communications.

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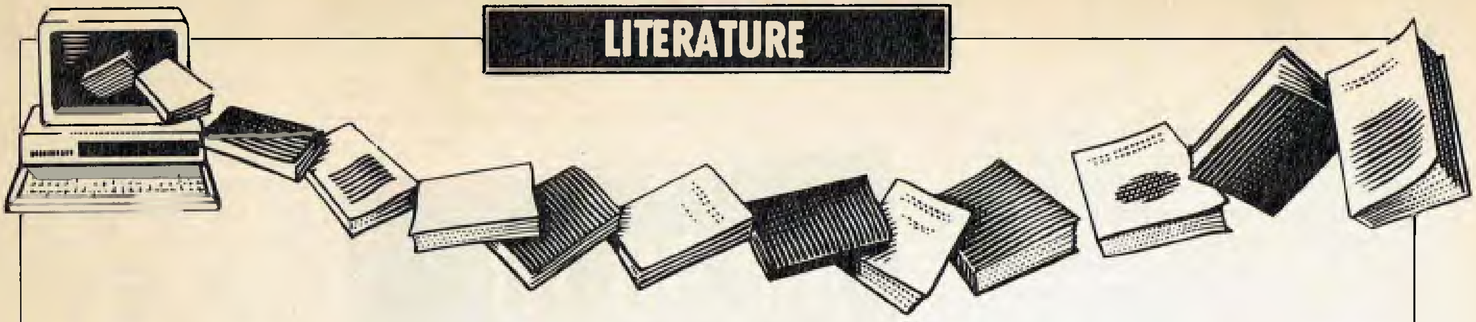
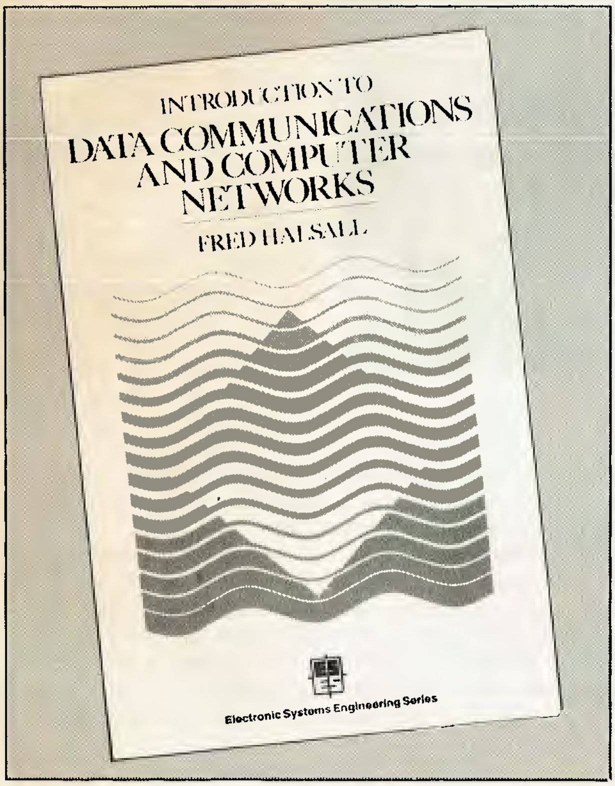
# LITERATURE



***Kevin Bergin reviews an assortment of current data communications books.***


INTRODUCTION TO
DATA COMMUNICATIONS AND COMPUTER NETWORKS
FRED HALSALL
Electronic Systems Engineering Series

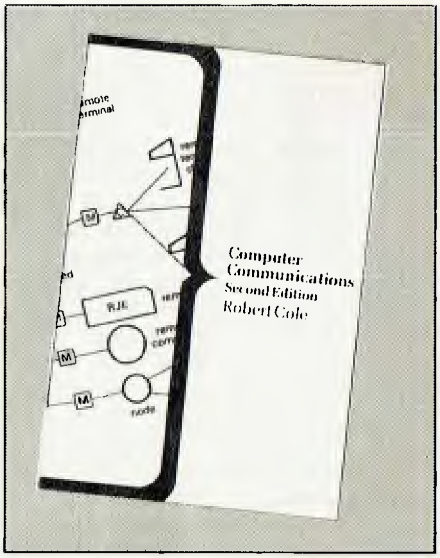
**TITLE: Introduction to Data Communications and Computer Networks**
**AUTHOR: Fred Halsall**
**PUBLISHER: Addison-Wesley**
**PRICE: $30.95**

This title is aimed mainly at engineering and computer science students, or could be used as a reference book for engineers and programmers. It could also be used as an introduction to the subject of communications by the novice, but there are other texts better suited to this subject.

This book was published in 1985 and is of English origin. The fact that it is not specifically written for the Australian market will not hamper the reader in this case, as the text concentrates mainly on theory. The book comprises some 270 pages which are split into eight chapters. The first chapter includes an introduction to data communications and the historical evolution of data communications. The rest of the first chapter is devoted to a look at different types of networks.

The other chapters take the reader (at a fairly technical level) step by step through data transmission, link-level protocols, electrical interface, terminal based networks, communications protocols and public data networks. As one might expect from an academic book (and an academic author), each chapter outlines the goals the reader should have reached by the end of the chapter, and just to check your understanding of the material, the author has included a number of problems at the end of each chapter.

I could not recommend this book as easy bedtime material, nor could the text be absorbed in one reading. However, considering the age of the book, it is very informative and very well set out, making it easy to follow in theory. The writing style is somewhat stiff, which could slow some readers down, or even discourage them from continuing. The price tag is a little too high for a 270 page paperback, but if this book is recommended for your course then you could do a lot worse.



**TITLE: Computer Communications Second Edition**
**AUTHOR: Robert Cole**
**PUBLISHER: Macmillan**
**PRICE: $19.95**

This is a very small paperback, weighing in at only 173 pages; again its author and place of publication are English, and this edition was published in 1986. The blurb on the book states that it is primarily intended for undergraduate students and those working in commercial computing. As the title suggests this is the second edition of the book, the main differences being updates on network technology and network architecture, reflecting international changes made to ISO standards.

This book is also written by a lecturer and is thus mainly aimed at students. However, it makes far from 'dry' reading, and would be a good introduction or reference book for those learning or involved in communications. The writing style throughout the book is clear and precise, with well set out and readable illustrations. The book is divided into ten chapters, covering a large range of topics in a very small space. The reader could well use this book to dip into a particular chapter, or read it straight through.

The first chapter covers the usual introduction to communications, using wire as the most common form of communications medium. There is a chapter covering the use of telephones to transmit and receive data. The author explains clearly the functions of modems and the techniques used to transmit data over lines that are primarily designed to carry human speech. A chapter on Character Terminal Networks outlines the possible types of networks, and their advantages and disadvantages. Another chapter on message based techniques discusses protocols used to exchange data and the next chapter takes us through the error detection and correction.

By far the most interesting section of the book is the chapter about computer network technology. It outlines the most common types of networks, including WANs (wide area networks), radio and satellite broadcast networks and local (or private) networks (LANs). Each of these networks is discussed in detail. The information given on each of the networks is fairly up to date, and like the rest of the book, is easy to follow. The last three chapters in the book are given to network systems architecture and look at the X.25 protocol and problems relating to, and mechanisms of, network interconnection. The final chapter is a look at end-to-end services in which security, protocol organisation, and common applications are examined.

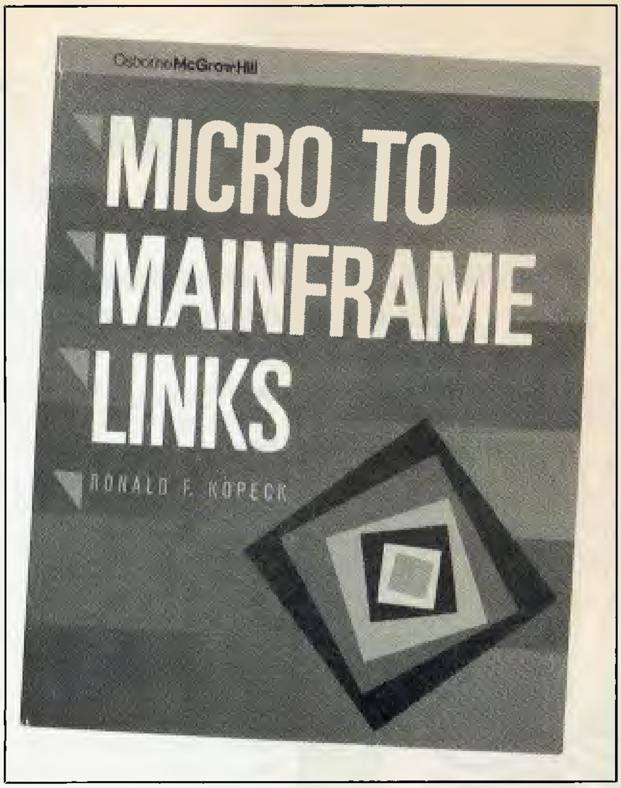
As mentioned earlier, this book is extremely well laid out and written, and one must recommend it to those interested in data communications theory or practice (especially at such a reasonable price).

**TITLE: Micro to Mainframe Links**
**AUTHOR: Ronald F Kopek**
**PUBLISHER: Osborne MacGraw-Hill**
**PRICE: $39.95**

The title of this book probably does more to attract owners and users of micros than any of the other literature reviewed here. The subject area is also topical (micros to mainframes), and one which is currently seeing the release of many new products, both hardware and software.

Unfortunately, this is an American publication, but at least it is fairly up to date, having been published in 1986. Most of the material in the book is applicable to the Australian market, but it leaves a number of holes. In my opinion, technical books should either be general enough to be read internationally, or be rewritten for the local markets, rather than dumping material from one continent onto others.

The book has ten chapters with some 286 pages. It purports to be mainly for professionals and EDP managers, as an aid to help organise all existing equipment, so as to maximise the use of PCs and keep control of data. It would also be useful for any individual using micro to mainframe links. Micro to mainframe links cover the enthusiast linking up to BBS services, or using a mainframe as a gateway to another service, up to corporate executives keeping tabs on all company activities. (At least that is the theory, maybe we will achieve this goal some time in the future).



The author of this book rightly states that micro to mainframe links are a 'hot' topic. Users can wander down this path and never be seen again, having lost themselves in the hype and buzz words, so what is needed is at least one authoritative book on the subject of communications. Unfortunately, this book does not fit the bill. It will, however, serve as an initial guide through the maze, starting by giving a number of practical uses of micro to mainframe links, and then moving on to the beginnings and the evolution of data communications (there seems to be an awful lot of material around on how it started and how it has developed!)

In the first chapter a section headed 'IBM Legitimises the PC' explains the arrival of the IBM PC, as the formal entry of micros into the computer business. Now there may well be a few voices out there ready to put this down, but we all know just how good, fast and flexible the 'Big Blue' is. The author tends to use phrases throughout such as 'the IBM connection' and 'the non IBM connection', however in the real world, there are a large number of computer manufacturers producing good micros and mainframes, and surprisingly, some of these products are widely used.

Some space is given to LANs; the various types currently available, and the possible interconnections, direct and remote. A reference is also made to Wide Area Lans which is a bit of a contradiction so perhaps we will leave that. Some of the more useful areas of this book concentrate on identifying networking needs and costing them effectively. In general, this book would be most useful to end-users with no idea of data communications, who would like to start reading a great deal of background information, with some examples that may or may not apply to their needs. A disappointing book that waffles a lot and never really seems to get down to business.

**TITLE: X.25 Explained**
**AUTHOR: RJ Deasington**
**PUBLISHER: Ellis Horwood**
**PRICE: $51.95**

This book was originally published in 1985 and reprinted in 1986, and is an English publication. As one would guess, this is a technical rather than a chatty book. In fact, it is not very chatty at all, having only 119 pages. The text concentrates mostly on ISO (International Standards Organisation) protocols, and sets out to describe existing layered architecture.

The first chapter of the book is devoted to an introduction of OSI and briefly describes the seven layers set up as the standard (or still under development) for the interconnection and communication between computers. IBM has had (and still has) a great deal of success with SNA (Systems Network Architecture), and DEC is having a good deal of success with

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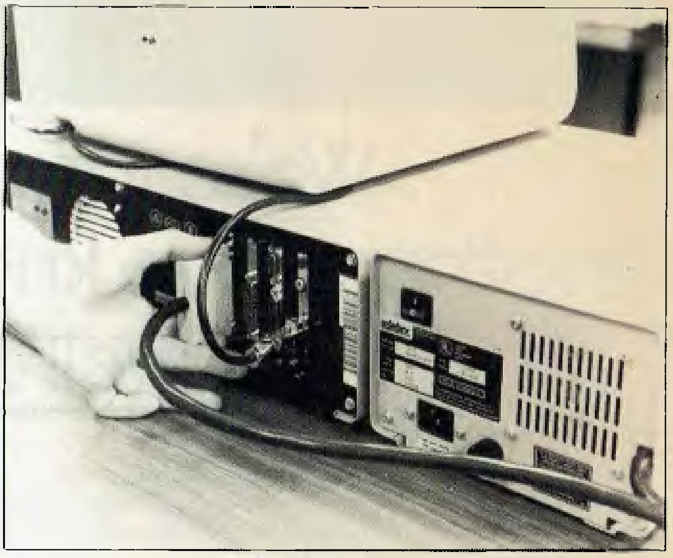

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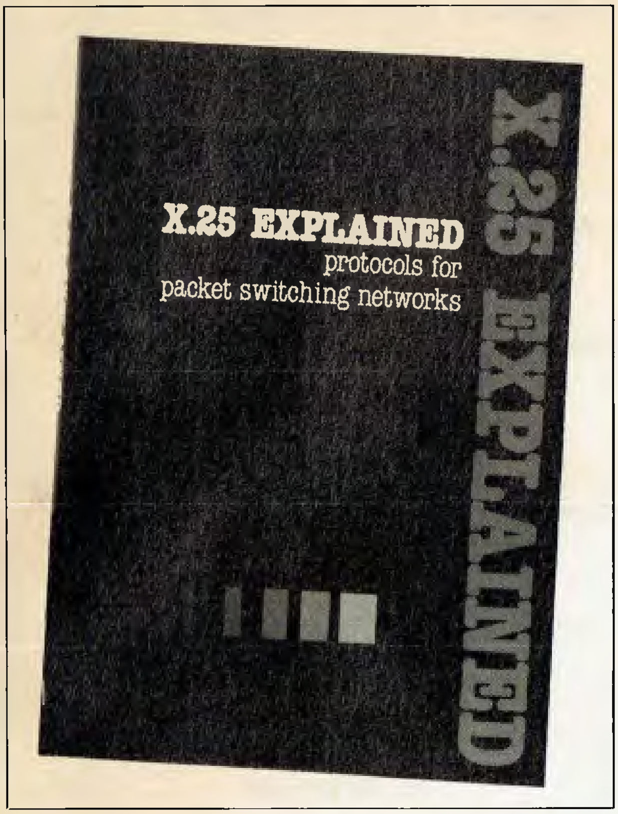

its DecNet product. The author of the book claims that both DEC and IBM have gone their own way and are not following standards recommended by the ISO. However, he does admit that he had trouble getting these standards down on paper as they change so rapidly!

The ISO seven layer model is meant to provide a default set of communications standards, and the book outlines the layers in a clear, concise format. The set of protocols used to transmit and receive data are given a great deal of consideration throughout the book. In general, this is an informative and well written text. However, there seem to be so many 'variations' on communication 'standards' that it is really not surprising that companies such as IBM and DEC run away with the goods, and this text brings nothing new to the arena.

This is a book which will help you understand the current communications standards, but is overpriced, in my opinion.

**TITLE: Data Communications Standards Edition III**
**AUTHOR: Edited by Harold C Folts**
**PUBLISHER: McGraw-Hill**
**PRICE: $975**

Before getting into the material in these three volumes, this reviewer would just like to point out that *APC* has not made an error in the price — it is $975. Now, having put that to one side, you can stop rolling around on the floor and read on.

The three volumes represent some 4261 pages of text, which based on a fast calculation on the best speed reader suggests that this is slightly more than an evening's reading and delving into the world of data communications standards. To review these volumes, one has to crawl into special clothes and wear kid gloves, drink special coffee and be particularly gentle, because of the price tag and the fact that this is the only complete copy on the Australian continent.

The three volumes are split into eight sections, which means that you can read volume one with only 1493 pages and five sections in one setting. These volumes are of course written as a reference guide, to be used principally by systems designers, planners and those organisations and committees involved in setting, documenting and keeping track of communications standards.

Volume I, part one, lists details of ANSI (American National Standards Institute). Part two lists electronic industries standards (eg RS-232-C), part three lists the Federal Standards in Telecommunication (USA). The list over the three volumes is huge, but papers on everything from telephone circuitry to network standards and ISO are included. There is even a section on European computer manufacturers (the Australian continent must be too small to include!) The last part of volume three is an index of communications standards (the Omnicom index of standards) which is exhaustively thorough.

In general, many of us may occasionally have a need to access some of the information included in these three volumes. However, before you mortgage your house, keep in mind that this work is constantly being updated so in a short while you may need to mortgage your parents' or friends' house. The solution, of course, is to find a library that has a copy of Data Communications Standards or convince a library that it would be a good move to buy one and let you borrow it immediately.

*All books provided by McGills Bookshop, 187 Elizabeth Street, Melbourne. Quoted prices were current at time of writing, but are subject to change.*

END

# WHAT'S ON

*A selection of training courses and exhibitions in the PC world*

- **April 7-9, 1987**
Australian Telecommunications User Groupannual exhibition and conference.
Venue: Hilton International Hotel, Sydney
Contact: Riddell Exhibition Promotions, 135-141 Burnley Street, Richmond, Vic 3121
Tel: (03) 429 6088

- **April 8-10, 1987**
Three day seminar/workshop on network planningand design.
Venue: The Boulevard, 90 William Street, Sydney
Contact: Management Technology Education, GPO Box 3939
Sydney 2001
Tel: (02) 290 3555

- **April 13-14, 1987**
Two day seminar on network protocols.
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- **April 13-15, 1987**
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- **May 10-14, 1987**
APL '87
Venue: Fairmont Hotel,
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Texas
Contact: APL '87 Register,
440 Northlake Shopping Centre,
Suite 210, Dallas, Texas USA 75238

- **May 11-15, 1987**
Ausgraph '87
Venue: Perth
Contact: Conference Secretariat,
PO Box 29, Parkville, Vic 3052
Tel: (03) 387 9955

- **May 31-June 3, 1987**
Office Technology '87
Venue: Exhibition Buildings, Melbourne
Contact: Australian Exhibition Services,
Suite 3.3, 424 St Kilda Road,
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Tel: (03) 264 4500

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PC '87 - The Ninth Australian Personal Computer Show
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- **June 1, 1987**
Communications, PCs and
Office Technology
Contact: Management Technology Education,GPO Box 3939,
Sydney 2001
Tel: (02) 290 3555

- **June 1-2, 1987**
The Merging of Computers and Communications
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- **June 8-14, 1987**
Computex Taipei
Venue: Taiwan, Republic of China
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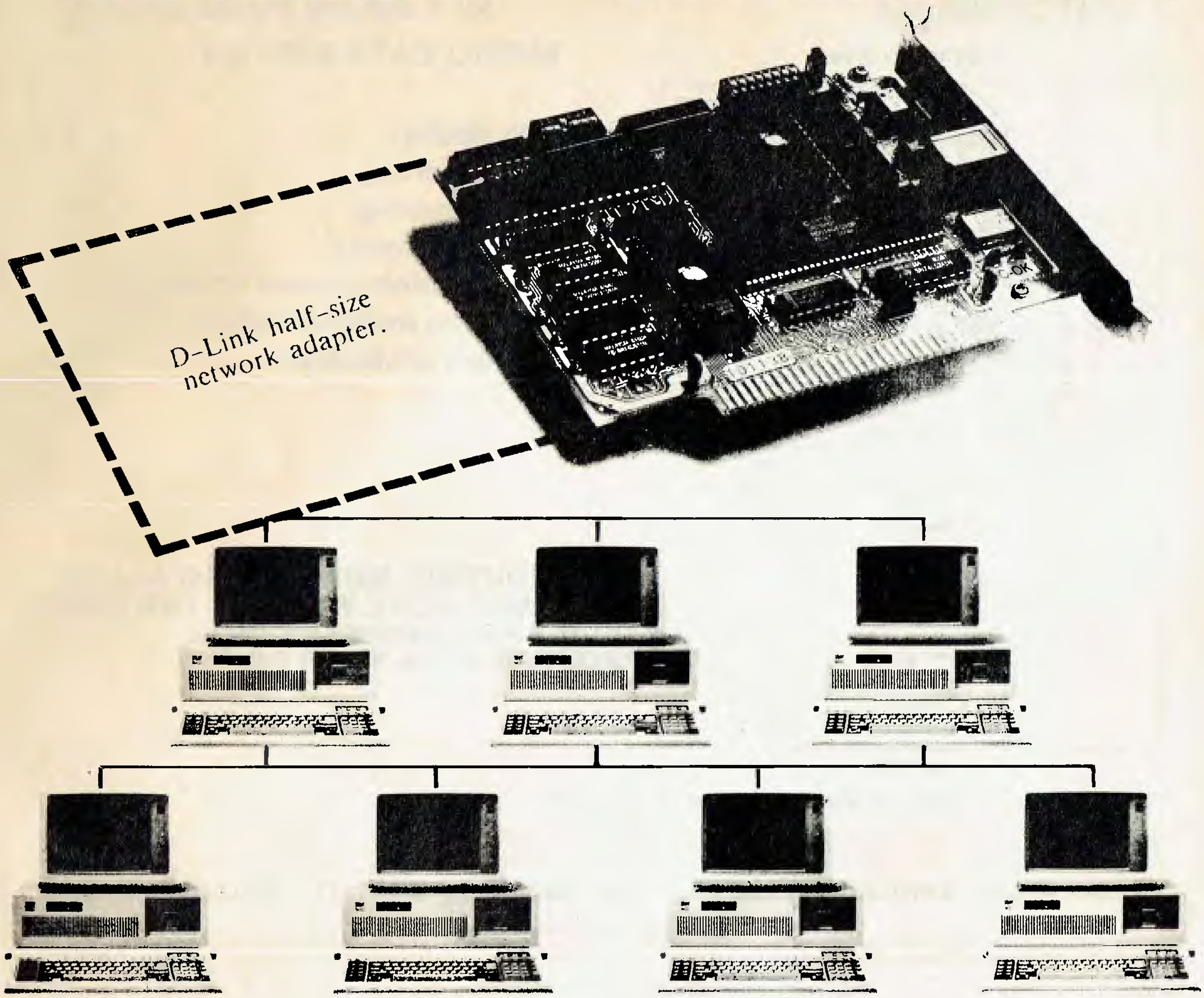

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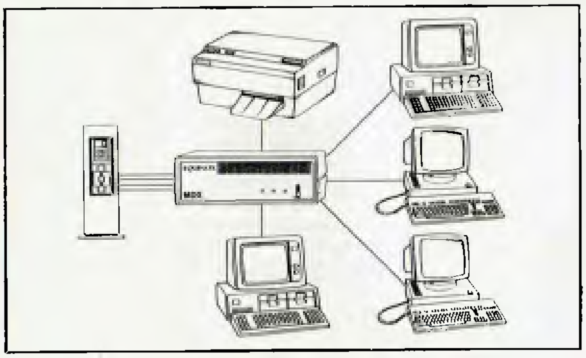

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- **June 15-18, 1987**
NCC '87 (National Computer Conference)
Venue: McCormick Place, Chicago, USA
Contact: American Federation of Information Processing Societies, 1899 Preston White Drive, Reston, Virginia 2209
Tel: (703) 620 8955

- **June 16-18, 1987**
Comdex International in Europe
Venue: Nice, France
Contact: TIG Australia Inc, 9th Floor, 8 West Street, North Sydney 2060
Tel: (02) 959 5555

- **June 30-July 2, 1987**
Videotex '87
Venue: Sheraton Hotel, Auckland, New Zealand
Contact: Secretariat
Tel: (649) 68 6955

- **August 19-21, 1987**
Comdex Australia
Venue: RAS Showground, Sydney
Contact: TIG Australia Inc, 9th Floor, 8 West Street, North Sydney 2060
Tel: (02) 959 5555

- **September 14-18, 1987**
IREECON International
Venue: RAS Showground, Sydney
Contact: IREECON International, PO Box 79, Edgecliff, NSW 2027
Tel: (02) 327 4822

- **January 19-22, 1988**
Information Online '88
Venue: Hilton International Hotel, Sydney
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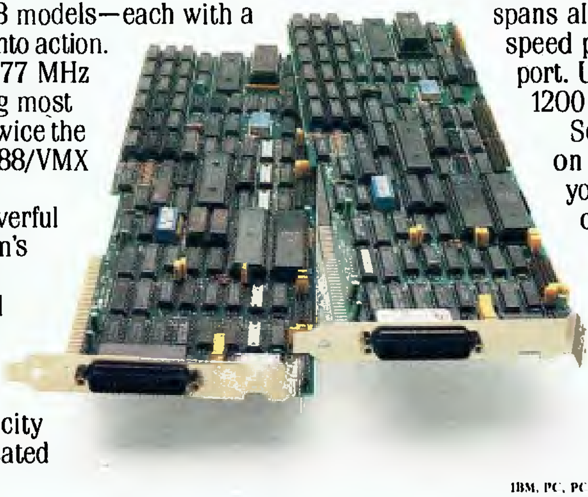

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